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VOLUME 33 MAY, 1927 NUMBER 5

THE INCIDENCE OF DYSENTERY AND DIARRHEA AMONG WHITE INFANTS UNDER TWO YEARS OF AGE*

LAWSON WILKINS, M.D.
BALTIMORE

Although dysentery is a distinct clinical entity and can be differentiated from other summer diarrheas,[1] there are not any accurate data of its incidence among the infant population. Health department statistics are usually not of value because the disease either is not reported or is masked under some other diagnosis. The figures from hospitals and dispensaries do not shed light on the prevalence of dysentery in the community at large. In order to determine the incidence of dysentery and also of "simple diarrhea," 628 normal infants were kept under observation from June 1 to November 1, 1925. The work was done in three of the Welfare Clinics established by the Thomas Wilson Sanitarium in Baltimore, at which are enrolled all the white infants of the district whose families are unable to provide adequate medical attention. This group may be considered fairly representative of the white infants in the poorer middle class sections of the city. These infants were brought regularly to the clinics or were visited at their homes by the nurses. Instruction was given in the preparation of milk formulas, and sterilization by boiling was advised.

The clinical differentiation of dysentery from diarrhea can be made on the basis of five features: (1) the presence of blood or pus associated with considerable mucus in the stools; (2) abrupt stormy onset; (3) fever; (4) persistent lack of appetite, and (5) slow response to the usual dietary treatment. It has been shown that dysentery bacilli can be found in the stools of 90 per cent of the patients having all these symptoms. In this work, because of lack of facilities, cultures of the stools were not made in the majority of the cases, and the differential diagnosis was a clinical one. Only those patients who had characteristic bloody stools or else had much mucus in the stools and all the other typical signs are recorded in this paper as suffering from "dysentery." Many other infants presented some of these signs and are classified as cases of

* Received for publication, Dec. 16, 1926.

1. Davison, W. C.: A Bacteriological and Clinical Consideration of Bacillary Dysentery in Adults and Children, Medicine **1**:389 (Nov.) 1922.

"probable dysentery." All other gastro-intestinal disturbances which showed nothing to suggest a dysenteric infection are listed as "simple diarrhea." In this way, any error is on the side of conservatism.

INCIDENCE OF DYSENTERY AND DIARRHEA

Table 1 shows the incidence of diarrhea and of dysentery among 628 infants under 2 years of age between June 1 and November 1. About 60 per cent did not have any gastro-intestinal disturbances during the summer. Twenty-seven per cent had simple diarrhea, and 7.6 per cent had typical dysentery. The remaining 5.3 per cent were considered as probably suffering from dysentery, although the diagnosis was open to question. Therefore, the incidence of dysentery lay somewhere between 7.6 per cent and 12.9 per cent. Approximately one fourth of the infants

TABLE 1.—*Number of Cases of Dysentery and of Diarrhea Occurring Between June 1 and November 1 in a Group of Six Hundred and Twenty-Eight Infants Under Two Years of Age*

	Breast Fed*		Artificially Fed†		Total		Infants Admitted to Harriet Lane Home	Total Deaths	
	No.	%	No.	%	No.	%		No.	%
Well	136	89.4	239	50.2	375	59.7	5 (other causes)	3 (other causes)	
Simple diarrhea	16	10.6	156	32.8	172	27.4	9	3	1.7
Probable dysentery	0	0	33	6.9	33	5.3	1	1	3.7
Dysentery	0	0	48	10.1	48	7.6	10	2	
Total	152	100	476	100	628	100	25	9	

* Includes only infants exclusively breast fed.
† Includes infants receiving partly breast feedings.

were exclusively breast fed. Among these only 10 per cent developed "simple diarrhea," and none developed dysentery. When the infants receiving artificial feeding are placed in a separate group, it is apparent that there is a much higher incidence of both diarrhea and dysentery than among these who were breast fed. Only 50 per cent of the artificially fed infants remained well; 33 per cent developed simple diarrhea; 10.1 per cent had typical dysentery, and the remaining 6.9 per cent probably had dysentery. Among the artificially fed infants, the incidence of dysentery was between 10.1 per cent and 17 per cent.

In all, there were 253 cases of intestinal disturbance during the summer. Forty-eight of these infants presented the characteristic signs of dysentery, and thirty-three others probably had the disease. Therefore, between 19 and 32 per cent of all the gastro-intestinal disturbances occurring during the summer were dysentery. It is interesting to note that 40 per cent of the patients having gastro-intestinal diseases admitted to the Harriet Lane Home for Children during the summer of 1923 had dysentery.

MORTALITY

Among the 628 infants there were nine deaths during the summer, six of them due to gastro-intestinal causes. Approximately one child in 100 under 2 years of age died during the summer from some type of diarrhea. Among the 172 cases of simple diarrhea, there were three deaths, a case fatality of 1.7 per cent. Among eighty-one cases of dysentery and "probable dysentery," there were likewise three deaths, making a case fatality of 3.7 per cent. These figures are in marked contrast to those of hospitals. In the Harriet Lane Home for Children, in 1923, the mortality for simple diarrhea was 7.5 per cent and for dysentery, 24.8 per cent. It is rational that hospital mortality records should be higher than those of the community at large, as the former are based only on severe infections.

DURATION AND SEVERITY

The incidence of simple diarrhea among the infants attending the clinics seems to be remarkably high. However, this is accounted for by the fact that this diagnosis was made whenever the bowels became loose

TABLE 2.—*Duration in Weeks of Attacks of Diarrhea and of Dysentery*

	Weeks												
	<1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-10	10-12	12-16	>16	Total
Diarrhea	121	50	10	8	5	0	0	2	0	0	4	0	200*
Dysentery	9	20	14	8	8	6	6	3	1	1	2	3	81*

* This figure represents the total number of attacks, not the number of children having the disease. Several children had more than one attack during the summer.

even for a brief duration. There were many trivial disturbances lasting for only a few days. An idea of the relative number of light and severe cases among both the diarrhea and dysentery groups can be obtained from table 2, in which the cases are tabulated according to duration.

It is seen that a large proportion of the attacks of simple diarrhea were of short duration, 60 per cent of all the attacks lasting less than one week and 85 per cent less than two weeks. On the other hand, dysentery was a disease of longer duration, only 11 per cent of the cases lasting less than one week and 35 per cent less than two weeks. This distribution is shown graphically in chart 1.

Of all cases of gastro-intestinal disturbance lasting less than two weeks, 171, or 85 per cent, were simple diarrhea and twenty-nine, or 15 per cent, were dysentery. Among the cases lasting longer than two weeks dysentery preponderated, there being twenty-nine cases, or 36 per cent, of simple diarrhea and fifty-two cases, or 64 per cent, of dysentery. Chart 2 illustrates this distribution.

The number of patients requiring hospitalization is an indication of the severity of a disease. Of twenty of the patients suffering from

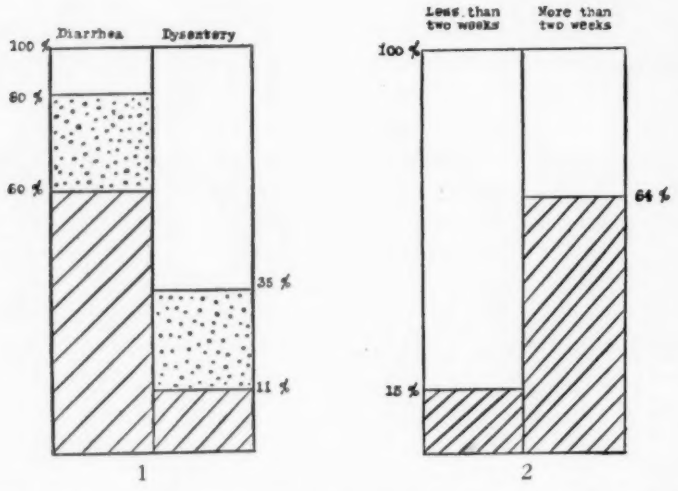

Chart 1.—Distribution of cases in relation to duration. The etched area indicates the percentage of cases lasting less than a week; the dotted area, the percentage of cases lasting from one to two weeks, and the plain area, the percentage of cases lasting more than two weeks.

Chart 2.—Distribution of attacks lasting less than two weeks in relation to the type of disturbance. The etched area indicates dysentery and the plain area, diarrhea.

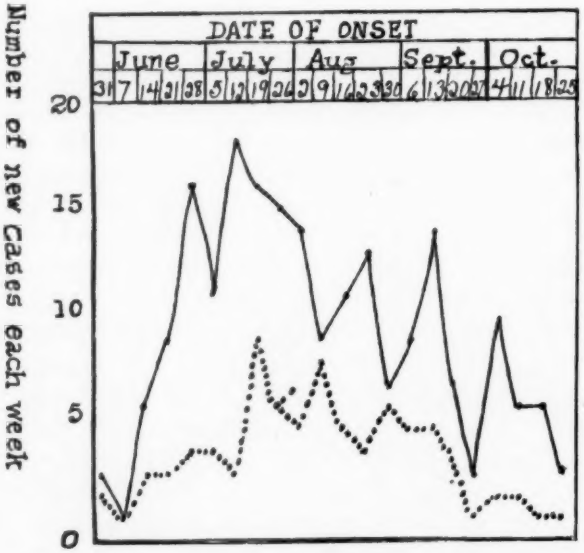

Chart 3.—Number of new cases of diarrhea and dysentery developing each week from June 1 to November 1. Solid line indicates simple diarrhea, and dotted line, dysentery.

gastro-intestinal diseases who were admitted to the Harriet Lane Home, eleven had dysentery. This distribution, when compared with the actual number of cases of each group, would seem to indicate that a large proportion of the dysentery cases were severe.

DATE OF ONSET

The number of cases of diarrhea and dysentery that developed each week is plotted in chart 3.

These curves indicate that there was a sudden increase in the number of cases of diarrhea about the middle of June and a gradual decrease during the latter half of the summer. Dysentery increased more gradually during June and continued at a high level until the middle of September.

TABLE 3.—*Ages of Infants Having Diarrhea and Dysentery*

	Breast Fed*				Artificially Fed				Total			
	First Summer†		Second Summer‡		First Summer		Second Summer		First Summer		Second Summer	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Well	136	89	0	0	139	53	100	46	275	66	100	46
Diarrhea or dysentery	16	11	0	0	122	47	118	54	138	34	118	54
Total	152	100	0	0	261	100	218	100	413	100	218	100

* Includes only infants exclusively breast fed.
† Includes infants born after Sept. 1, 1924.
‡ Includes infants born before Sept. 1, 1924.

AGE AT ONSET

It is a common saying that an infant is more likely to have diarrhea during his second summer than during his first. The ages of the patients who suffered from diarrhea and dysentery are illustrated in table 3.

It is seen that 54 per cent of the infants develop gastro-intestinal disease in the second summer and only 34 per cent in the first summer. This difference is largely accounted for by the fact that a high proportion of the infants are breast fed during their first summer. When the breast-fed infants are eliminated, it is seen that among those artificially fed there is not a great difference between the first and second summers in liability to gastro-intestinal disturbances. (The difference between 54 and 47 per cent is not of any significance in such a small series of cases.)

COMMENT

These statistics emphasize the fact that dysentery is prevalent among infants under 2 years of age. From 7.5 to 13 per cent of all the infants in our series, and from 10 to 17 per cent of those artificially fed contracted dysentery during the summer of 1925. The group studied is representative of the poorer middle classes of the white population

throughout the city. Although the disease is certainly less prevalent among the more well-to-do classes, it is encountered with frequency in homes of all types and in all sections of the city. It is impossible from the study of a single group of children to draw any conclusions as to the incidence of dysentery in the city at large or as to the total number of cases occurring each summer. There are certainly wide variations between different sections of the city. Like any other infection, there are also great differences in its prevalence from year to year. Although complete records were not kept, I am certain that in the summer of 1926 there was a much lower incidence of both dysentery and simple diarrhea in the same section of the city than in 1925. The sole purpose in the present paper is to emphasize that bacillary dysentery is common and widespread among infants in Baltimore. It is obvious that among the 32,400 infants under 2 years of age estimated for Baltimore many cases of dysentery must occur each summer. The figures show that the case fatality of dysentery is lower than hospital statistics indicate. But, even though the case fatality is low, the disease is so prevalent that it causes a large proportion of the deaths due to gastro-intestinal causes. From the point of view of both prevalence and mortality, dysentery ranks among the most important infectious diseases of infancy, and the question of its control and prevention demands serious consideration.

SUMMARY

1. In a group of 628 white infants under 2 years of age representative of the poorer middle class, from 7.5 to 13 per cent developed dysentery during the summer of 1925, and 27 per cent developed simple diarrhea. Among those not exclusively breast fed the incidence of dysentery was from 10 to 17 per cent and of diarrhea 33 per cent.

2. Of all the cases of gastro-intestinal disturbance encountered, from 19 to 33 per cent were caused by dysentery.

3. Dysentery is of much longer duration than "simple diarrhea," lasting more than two weeks in 65 per cent of the cases.

4. When breast-fed infants are excluded, there is approximately the same frequency of gastro-intestinal disturbances during the first and second summer of life.

5. It is important to recognize that dysentery is one of the most common infectious diseases among infants.

1014 Saint Paul Street.

AN UNSUCCESSFUL ATTEMPT TO PROTECT INFANTS AGAINST DYSENTERY BY THE ORAL ADMINISTRATION OF VACCINE*

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BALTIMORE

It has been shown in a previous paper [1] that bacillary dysentery is prevalent among infants under 2 years of age and that in the group in which the present study was made its incidence was as high as 10 per cent. The prevention of this disease is therefore one of the most important problems of public health.

From the point of view of infectiousness and mode of transmission, dysentery is in many ways comparable to typhoid fever, but there is no evidence that under usual conditions it is transmitted through milk and water supplies. It is more likely that it is spread directly from patient to patient and from house to house by flies and the hands of attendants. There are many mild undiagnosed cases of dysentery in adults and probably there are many healthy carriers who have previously had the disease and who are a constant source for the dissemination of the organism. The disease occurs at all seasons of the year, but becomes widespread in the months in which flies are prevalent and the windows are open. The disease is so widespread and its infectious nature is so little recognized that its control by the usual methods of isolation and quarantine is nearly hopeless, especially among the poorer sections of the population. The majority of the infections are due to the Flexner type of dysentery bacilli. The prophylactic immunization of infants under 2 years of age against the Flexner group of dysentery bacilli was studied with the hope of decreasing the incidence of the disease.

Dysentery vaccines given subcutaneously have stopped epidemics of dysentery in adults [2] and in children,[3] but the difficulties in vaccination

* Received for publication, Dec. 10, 1926.

1. Wilkins, L.: The Incidence of Bacillary Dysentery and of Diarrhea Among Infants Under Two Years of Age, Am. J. Dis. Child., p. 705, this issue.

2. Shiga, K.: Ueber die Priorität der Entdeckung des Ruhrbacillus und der Serumtherapie bei der Dysenterie, Deutsche med. Wchnschr. **29**:113, 1903. Gibson, H. G.: Results Obtained from the Use of Anti-Dysenteric Sero-Vaccine in the Field, with Regard to the Reduction of Case Incidence, J. Roy. Army M. Corps, London, **30**:476, 1918. Vincent, H.: Sur la vaccination de l'homme contre la dysenterie bacillaire, Compt. rend. Soc. de Biol. **85**:965, 1921. Csernel, E.: Beitrag zur Schutzimpfung gegen Dysenterie mittels Serovakzine, Ztschr. f. Hyg. u. Infectionskrankh. **91**:53, 1920.

3. Wilkins, L., and Wells, H. S.: Immunization of Children Against Flexner Dysentery, J. A. M. A. **82**:1599 (May 17) 1924.

on a large scale led Gauthier [4] to give dysentery vaccine by the oral route. He reported excellent results in stamping out epidemics of dysentery among the Greek refugees.

The vaccine used in the present work was prepared by Fulton and Berry,[5] and 1 cc. contained 400 million of each of five strains of Flexner bacilli. Its ability to produce agglutinins and its harmlessness were proved by feeding it to rabbits in large doses. The present study is confined to its effect on the incidence of dysentery among artificially fed white infants under 2 years of age. There were 476 infants of this group under observation during the summer. At the mother's request, 107 of these were given doses of 5 cc. each on three successive days. The vaccine was administered in the infant's milk mixture. In each instance the welfare nurse was present and saw that the entire dose was taken. Little difficulty was encountered in the administration of the vaccine, the infants apparently not objecting to the small amount of

TABLE 1.—*Frequency of Dysentery and of Simple Diarrhea Among Artificially Fed Infants. Comparison of Vaccinated and Control Groups*

	Vaccine		No Vaccine		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Dysentery	10	9.3	38	10.3	48	10.1
Probable dysentery	9	8.4	24	6.5	33	6.9
Simple diarrhea	41	38.3	115	31.2	156	32.8
Well	47	44.0	192	52.0	239	50.2
Total	107	100	369	100	476	100

phenol in it. A febrile reaction was not encountered, although four or five infants developed slight diarrhea lasting only a day or two after the administration of the vaccine.

The infants of both groups were kept under constant observation from June 1 to November 1, and careful notes were made of any gastro-intestinal disturbance occurring during this time. The administration of vaccine was begun in June, and nearly all the doses were given during that month, although a few were given in July. The vaccine was not given to any infants who had been sick previously. The incidence of dysentery and of simple diarrhea was compared in the two groups. The diagnosis of "dysentery" and "probable dysentery" was made on the basis described in the preceding paper.[1]

A comparison of the incidence of dysentery and simple diarrhea among the infants who received the vaccine and those who did not is shown in table 1.

4. Gauthier, A.: Essais de vaccinations et de vaccinotherapie par le voie buccale contre la dysenterie bacillaire, Bull. Acad. de méd., Paris **91**:72 (Jan. 15) 1924.

5. Fulton, M. N., and Berry, G. P.: Agglutination Reactions in Rabbits Following Oral Vaccination with Bacillus Dysenteriae, Am. J. Dis. Child., p. 714, this issue.

From the table it can be seen that the oral administration of the dysentery vaccine did not affect the frequency of the disease. Nine and three tenths per cent of the infants who received the vaccine and 10.3 per cent in the control group contracted dysentery. If the cases of "probable dysentery" are counted together with those of typical dysentery, 17.7 per cent of the vaccinated and 16.8 per cent of the unvaccinated patients developed the disease. Ten infants developed typical dysentery in spite of the use of the vaccine. In a number of cases cultures were made from the stools, and the Flexner type of bacillus was obtained. These cases occurred at intervals varying from three to ten weeks after the administration of the vaccine. The character and severity of the disease was the same in the two groups. There was one death from dysentery among the vaccinated and one among the unvaccinated group.

COMMENT

The value of any vaccine must be judged by its ability to protect against a disease in nature and not by its power to produce agglutinins or similar bodies. The comparison of the frequency of dysentery in the two groups is a fair test of the protective value of the vaccine when administered by this method, as the living conditions, feeding methods and care of the vaccinated and of the control infants were identical. The vaccine administered orally by the technic described in this paper is therefore worthless from a practical standpoint. This does not, however, disprove the possible value of oral vaccine against dysentery. It is still possible that by a modification of the preparation of the vaccine or of the method of dosage it might be made effective, as both Gauthier and Fulton and Berry have found that agglutinins are produced by the oral administration of vaccine. There are some points of difference between the technic described and that of Gauthier. He used a vaccine that contained the Shiga as well as the Flexner groups. He also insisted on giving the vaccine when the stomach was empty. Fulton and Berry's work on rabbits apparently indicated that this was not important, since the rabbit's stomach always contains food. My dosage was greater than that of Gauthier.

SUMMARY

A vaccine containing two billions each of five strains of Flexner dysentery bacilli was given by mouth on three successive days to 107 infants under 2 years of age. The frequency of dysentery among the infants who received the vaccine was identical with that among a control group of 369. The vaccine administered orally by the technic described did not protect against dysentery.

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AGGLUTINATION REACTIONS IN RABBITS FOLLOWING ORAL VACCINATION WITH BACILLUS DYSENTERIAE *

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Considerable work has been done in recent years on protection against bacillary dysentery by the oral administration of dysentery vaccines. Enlows [1] gives a review of the literature, much of it indicating that some immunity at least is afforded by the ingestion of killed dysentery bacilli. The greater part of the work has been done with the Shiga type of organism, as it is the chief type causing serious dysentery in adults. In children in this country, however, the Shiga bacillus is found only in a small percentage of the cases as compared with those caused by the several strains of the Flexner dysentery organism. It was suggested to us that before any attempt was made to determine the efficacy of feeding a killed Flexner vaccine to children its ability to produce antibodies in rabbits should be tested by feeding them the vaccine. This work was therefore undertaken to determine, if possible, any evidence of immunity in rabbits and later in children after the oral administration of such a vaccine.

The vaccine was made up from a 24 hour growth of the English strains of Flexner dysentery bacilli, V, W, X, Y, and Z, on plain agar in Blake bottles. This growth was washed off with 0.85 per cent saline solution, heated at 75 C. for thirty minutes and then tested for sterility. If a growth did not occur the vaccine was diluted so as to contain a total of 1 billion organisms per cubic centimeter, this number being estimated by comparison with typhoid vaccine of known count. The suspension thus prepared was fed to the rabbits through a syringe, after their serums had been examined for agglutinins against the strains used. Macroscopic agglutination tests with formolized broth cultures were employed.

The results of two of the experiments are shown in charts 1 and 2. Readings for the "W" strain were disregarded because this strain was found in most instances to be agglutinated spontaneously. The readings represent only definitely positive agglutinations. In some cases there were "plus-minus" or "questionable" results in weaker dilutions, but these are not shown on the charts.

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* Received for publication, Dec. 10, 1926.

* From the Department of Pediatrics, Johns Hopkins University Medical Department.

1. Enlows, E. M. A.: Vaccination by Mouth Against Bacillary Dysentery. Pub. Health Rep. **40**:639 (April 3) 1925.

The matter of dosage was found to be of considerable importance, notably in case of rabbit 11*a'*, whose serum developed scarcely any agglutinating power after three feedings of 2 cc. each, but a distinct response after the dose had been doubled and later increased by five times. The Flexner "Z" appears to be the most readily agglutinated strain, in rabbit 11*b* showing agglutination on three successive occasions with serum at a dilution of 1 : 200. In every instance control tubes were set

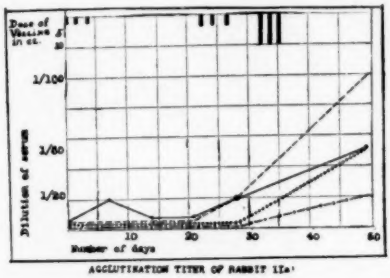

Chart 1.—Agglutination titer of rabbit 11 *a'*. In this and chart 2, the straight line is Flexner "V"; dash and dot line, Flexner "X"; dotted line, Flexner "Y", and dash line, Flexner "Z."

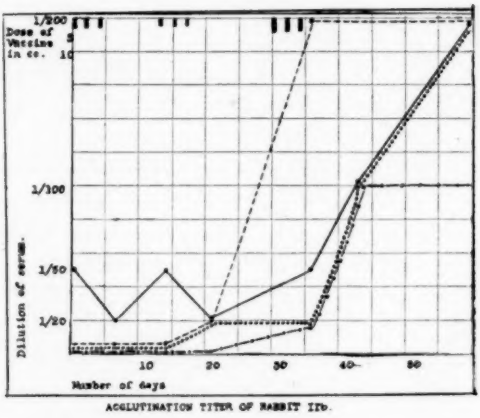

Chart 2.—Agglutination titer of rabbit 11 *b*.

up, none of them showing any agglutination of the four strains charted. A series of ten animals was run, all of them showing agglutinating power in their serums, but none so effectively as the two here noted.

Following these experiments, similar ones were performed on ourselves and on five patients in the Harriet Lane Home, but definite agglutinating properties of the serum could not be demonstrated in dilutions higher than 1 : 20, and that in only two strains. The dose of the vaccine here was 10 cc. on three successive days.

This evidence of definite agglutinative properties developed in the rabbit serum was at least indicative of a serologic response. Could the vaccine have any prophylactic effect in infants? Nothing could be claimed for it, but it seemed worthy of a trial. A stock was therefore made up to contain 400 million of each of the five strains per cubic centimeter to be given in 5 cc. doses on three successive days to children attending a local feeding clinic.[2]

The work described above merely demonstrates that agglutinating properties can be produced in the serum of rabbits by the oral administration of killed dysentery bacilli. The problem is worthy of further study.

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2. Wilkins Lawson: An Unsuccessful Attempt to Protect Infants, Am. J. Dis. Child., p. 711, this issue.

A REVERSAL OF THE NORMAL CONCENTRATION OF THE URINE IN CHILDREN HAVING ENURESIS*

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In connection with a study of a group of thirty-nine children suffering from enuresis, the observation was made that in a certain percentage of the more persistent cases the concentration of the urine was definitely and constantly higher during the day than during the night. The occurrence of a reversal of the usual concentration of the urine in children suffering from this condition apparently has not been observed to date and consequently was considered of sufficient interest and importance to justify reporting.

The observations were made on thirty-nine patients at the university dispensary and are recorded in tables 1 and 2. Each child in the series was carefully examined to avoid including those suffering from pyelocystitis or other diseases presenting symptoms referable to the genitourinary system. Twenty-four hour samples of urine were collected from each patient, the day and night specimens being kept separate. The specimens were carefully measured and examined chemically and microscopically according to the customary routine. Cases in which the urine was abnormal were not included in this series. As a result of these precautions all the children undoubtedly represented uncomplicated cases of enuresis of varying degrees of severity.

The entire group was subjected to the same regimen of treatment, which included restricting the fluid intake after 4 p. m., abstaining from tea, coffee, and highly seasoned food and retiring to bed at 7:30 p. m. on a hard mattress. In addition, each child was given a hypodermic injection of 1 cc. of sterile water once a week and was assured that this treatment would result in a cure. They were warned, however, that should a relapse occur, additional injections would be administered. Limiting the active therapy in these children to injections of sterile water for their psychic effect was prompted by a desire to test the widely prevalent opinion that enuresis often is psychogenic[1] in origin and frequently responds to psychic treatment.

The results obtained by the therapeutic procedures instituted are recorded in table 1. Twenty-nine of the children (group *A*, table 1) included in this series were relieved of their condition without a relapse over a period of six months following from one to three injections of 1 cc. each of sterile water. These prompt and permanent cures, how-

* Received for publication, Dec. 16, 1926.

* From the Pediatric Department, University of Minnesota Medical School.

1. Janet, J.: Les troubles psychopatique de la miction, These de Paris, 1890.

TABLE 1.—*Results of Therapeutic Procedure* *

No. of Cases	Sex†	Age	No. of Injections	Family Cooperation	Results
Group A.—Children having higher concentration of urine at night than during day					
1	♂	4	3	Good	Cure without a relapse in six months
1	♂	5	2	Good	Cure wtihout a relapse in six months
1	♀	5	2	Good	Cure without a relapse in six months
2	♂	6	2 and 3	Good	Cure without a relapse in six months
1	♀	6	1	Good	Cure without a relapse in six months
5	♂	7	3 or less	Good	Cure without a relapse in six months
3	♀	7	3 or less	Good	Cure withuot a relapse in six months
3	♂	8	3 or less	Good	Cure without a relapse in six months
5	♀	8	3 or less	Good	Cure without a relapse in six months
3	♂	9	3 or less	Good	Cure without a relapse in six months
1	♀	9	1	Good	Cure without a relapse in six months
1	♂	10	3	Good	Cure without a relapse in six months
1	♀	11	1	Good	Cure without a relapse in six months
1	♂	13	1	Good	Cure without a relapse in six months
1	♂	13	1	Poor	Relapse
Group B.—Children having a concentration of urine in day either equal to or greater than at night					
1	♂	7	5	Good	Cure without a relapse in six months
1	♂	9	4	Good	Cure without a relapse in six months
1	♀	6	2	Good	Cure without a relapse in six months
1	♀	10	6	Good	Cure without a relapse in six months
1	♀	11	5	Good	Cure without a relapse in six months
1	♀	7	3	Poor	Relapse
Group C.—Children having a higher concentration of urine in day than at night					
1	♂	6	More than 6	Good	No cure
1	♂	7	More than 6	Good	No cure
1	♀	10	More than 6	Good	No cure

Total, 39; 34 cured, 5 failures, 87 per cent cured.
* Injections were given once a week.
† In this table and in table 2, ♂ indicates male; ♀, female.

TABLE 2.—*Amount and Concentration of Urine* *

			First 24 Hours' Urine				Second 24 Hours' Urine				Third 24 Hours' Urine			
			Amount		Sp. Gr.		Amount		Sp. Gr.		Amount		Sp. Gr.	
Name	Sex	Age	Day†	Night‡	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
A. In Cases of Normal Concentration (night concentration greater than day concentration)														
I. B.	♀	7	180	160	1.020	1.028	210	200	1.018	1,024	175	260	1.022	1.026
R. Y.	♂	9	260	250	1.018	1.022	160	200	1.026	1.028	280	200	1.018	1.030
L. M.	♂	8	200	180	1.020	1.024	400	150	1.018	1.026	230	170	1.016	1.022
J. R.	♂	12	450	360	1.012	1.022	380	260	1.014	1.024	325	260	1.018	1.026
H. B.	♀	10	380	410	1.018	1.020	260	230	1.020	1.022	300	240	1.016	1.020
B. In Borderline Cases														
R. C.	♂	7	680	500	1.026	1.020	480	360	1.022	1.022	210	525	1.030	1.026
W. B.	♂	9	125	200	1.018	1.016	300	260	1.028	1.028	175	150	1.020	1.022
M. K.	♀	6	650	375	1.012	1.016	410	300	1.020	1.018	310	400	1.024	1.020
C. M.	♀	10	160	110	1.018	1.018	350	300	1.016	1.020	160	500	1.022	1.018
M. O.	♀	11	420	550	1.036	1.020	500	100	1.018	1.024	300	360	1.020	1.018
B. L.	♀	7	150	175	1.012	1.016	310	200	1.020	1.016	270	400	1.018	1.022
C. In Cases with Marked and Constant Reversal of Concentration														
B. T.	♂	6	450	300	1.026	1.018	375	400	1.032	1.020	500	380	1.028	1.020
M. K.	♂	7	360	300	1.022	1.014	510	360	1.026	1.014	400	420	1.030	1.018
B. L.	♀	10	180	400	1.034	1.018	320	500	1.022	1.010	500	320	1.030	1.022

* Twenty-four hour specimens of urine were examined every seven days.
† The day specimen was collected after 7 a. m. up to and including 7 p. m.
‡ The night specimen was collected after 7 p. m. up to and including 7 a. m.

ever, occurred in children who had a greater concentration of urine at night than during the day. In some instances the cure was so complete that the child could sleep throughout the entire night without urinating. In other cases, however, the sensation of the distended bladder would awaken patients who previously slept so soundly that unconscious urination occurred, thus enabling them to arouse and go to the toilet. In these cases nocturia persisted, but the hypodermic injection apparently had been effective in a sufficiently forceful and suggestive manner, that stimuli arising from the distended bladder now received sufficient recognition in subconsciousness during sleep to awaken the patients. The one failure recorded in this group of twenty-nine children having a normal concentration of the urine (night concentration higher than the day concentration) occurred in a child who lived so far from Minneapolis that it was impossible to exercise a proper supervision over the situation. Also the family cooperation in this instance was unsatisfactory. As a result of this experience, it appears that children suffering from enuresis usually may be promptly and permanently relieved of their trouble by the employment of psychic therapy in the form of subcutaneous injections of sterile water in instances in which the concentration of the urine is greater at night than during the day. Greater difficulty is frequently encountered in accomplishing cures in children having an abnormal concentration of the urine. Thus, five patients (group *B*, tables 1 and 2), having urine whose specific gravity during the day was equal to or slightly greater than the concentration occurring at night, required from two to six injections before they were relieved of their enuresis. Thus cures, although obtained, were accomplished with greater difficulty in this group than in children showing a normal urinary concentration. The single failure recorded in group *B*, table 1, occurred in a child whose family cooperation was unsatisfactory. If other factors were contributing to this failure they were not discovered.

A complete failure to accomplish a cure occurred in three instances (group *C*, tables 1 and 2) in each of which the family cooperation was excellent. A careful study of concentration of the urine of each of these three children revealed a persistent and definitely higher specific gravity during the day than during the night: a situation considered just the reverse of normal. In each of these cases the hypodermic injections made a profound impression on the children, and although the patients were seriously concerned about their condition and the family cooperation and moral support were excellent, nevertheless the enuresis persisted. The impression was gained, therefore, that the enuresis in these patients may have resulted from the abnormal physiologic action of the kidney with reference to the concentration of the urine. In order to study this condition more carefully, one of these patients, a girl, aged 10 years, was admitted to the University Hospital. The blood count

proved to be normal, and the urine was normal from a chemical and microscopic standpoint. The blood pressure apparently was somewhat low, the diastolic readings ranging from 40 to 60 mm. of mercury, and the systolic determinations varied from 80 to 90 mm. of mercury. A single determination of the blood sugar gave a value of 0.055, which probably was a faulty determination. A study of the specific gravity of the urine in this case (table 3) at two and four hour intervals revealed a range in concentration from a minimum of 1.006 between 8 p. m. and 2 a. m. to a maximum of 1.027 to 1.029 between 12 a. m. and 5 p. m. During the stay in the hospital, the concentration of the urine thus was the reverse of what is normally expected, being higher in the day than during the night. Since her dismissal from the hospital, this condition has persisted, uninfluenced by various diuretics and other therapeutic procedures employed to alter the situation.

TABLE 3.—*Variation in Specific Gravity of the Urine at Two and Four Hour Intervals*

5/25/26	2 p. m. 1.021	5/27/26	2 a. m. 1.006	5/28/26	3 a. m. 1.015	5/29/26	3 a. m. 1.012
	4 p. m. 1.020		6 a. m. 1.016		7 a. m. 1.020		7 a. m. 1.014
	6 p. m. 1.016		8 a. m. 1.016		9 a. m. 1.020		
	8 p. m. 1.006		10 a. m. 1.016		11 a. m. 1.028		
	10 p. m. 1.006		12 noon 1.027		3 p. m. 1.022		
	2 p. m. 1.006		2 p. m. 1.010		5 p. m. 1.029		
			6 p. m. 1.009		7 p. m. 1.022		
					9 p. m. 1.012		

COMMENT

To my knowledge, the occurrence of a reversal of the concentration of the urine in certain patients having enuresis to date has escaped attention. The existence of this condition possibly is an important etiologic factor, especially in patients failing to respond to psychic therapy. As to the etiology of enuresis in general, an opinion is not ventured. Attention is called, however, to Kovats'[2] theory that enuresis is an early symptom of tuberculosis of the endocrine glands, especially of the suprarenals. Kovats reports success in treating patients with injections of tuberculin which, he claims, proves this theory. Mueller,[3] suspecting suggestion to be a great therapeutic factor, also tried injections of a tuberculin in his series, making certain that suggestions of all kinds were excluded, and he did not obtain the good results reported by Kovats. The cures obtained at the university dispensary by the simple injection of sterile water as a psychic therapeutic agent supports Mueller's opinion regarding the importance of suggestion in treating

2. Kovats, F.: Die Funktionellen Miktions Starunen Tuberkulosen Ursprungs, Ztschr. f. Tuberk. **39**:185, 1923; Erviderung zu Vorstehendem Artickel, Ztschr. f. Tuberk. **42**:297, 1925.

3. Mueller, P.: Die Beeinflüssung der Enuresis durch Tuberculinjektione, Ztschr. f. Tuberk. **42**:294, 1925.

enuresis. Various other forms of psychic therapy have been employed with success; they do not necessarily have to excite pain or fear on the part of the child. In the hands of those clever in psychic treatment, the employment of methods avoiding discomforts possibly are advisable. In all cases, however, treatment should await a careful determination that the kidneys concentrate the urine in the normal manner.

SUMMARY

1. In treating thirty-nine children having enuresis, the psychic treatment in the form of a hypodermic of sterile water proved successful in 87 per cent of the cases.

2. In patients whose urine showed a persistent reversal of concentration, when the specific gravity of the day specimen was greater than the night, the treatment proved a failure.

3. In borderline cases in which the specific gravity of the urine during the day was equal to or slightly greater than that of the night urine, a cure usually was obtained but with more difficulty than in patients with a normal concentration.

4. With respect to the specific gravity of the urine, children having enuresis may be divided into three groups: (1) Those having a higher concentration of the urine at night than during the day; (2) those having a concentration of the urine during the day equal to or slightly greater than at night, and (3) those having a persistent and definitely higher specific gravity of the urine during the day than during the night.

5. The occurrence of a reversal of the normal concentration of the urine in children having enuresis apparently has not been reported previously.

THE RESPIRATORY METABOLISM IN INFANCY AND IN CHILDHOOD

VI. THE SPECIFIC DYNAMIC ACTION OF FOOD IN NORMAL INFANTS *

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The present study of the effect of food on the heat production of normal infants was made preliminary to a similar study of marantic infants in an effort to answer the question, Does food stimulate metabolism excessively in marasmus? If so, this excessive specific dynamic action may play a rôle in the failure of some marantic infants to gain weight even while on a caloric intake considerably in excess of the computed energy requirement and in the absence of evident infection.

The present paper reports the results of the normal controls. The results for the athreptic infants will appear in a later communication.

REVIEW OF THE LITERATURE

C. Voit,[1] Magnus-Levy [2] and Rubner [3] were among the first to show that the ingestion of food augments metabolism. Later observers unanimously confirmed this. It remained, however, for Lusk [4] to clarify the doctrine of the specific dynamic action of individual foodstuffs and the mechanisms involved. A review and discussion of the literature together with a presentation of his own views appeared in his book, in 1917,[5] and more recently in a monograph.[6] Most students of the subject, including the aforementioned author, have worked with animals or with adults.

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* Received for publication Dec. 27, 1926.

* From the Department of Pediatrics, Cornell University Medical College, and the New York Nursery and Child's Hospital.

1. Voit, C.: Physiologie des allgemeinen Stoffwechsell und der Ernährung, Handbuch der Physiologie des Gesammt-Stoffwechsell und der Fortpflanzung, Leipzig, 1881, pp. 308, 311.

2. Magnus-Levy, A.: Arch. f. d. ges. Physiol. **55**:103, 1894.

3. Rubner, M.: Die Gesetze des Energieverbrauchs bei der Ernährung, Leipzig, 1902.

4. Lusk, G.: Animal Calorimetry—Series of Articles in J. Biol. Chem. from 1912 to 1926.

5. Lusk, G.: Elements of Nutrition, 3, Philadelphia and London, W. B. Saunders Company, 1917.

6. Lusk, G.: The Specific Dynamic Action of Various Food Factors, Medicine **1**:311, 1922.

These studies will not be considered here. Reference will be made only to the few accurate studies on infants in which all factors capable of influencing metabolism were controlled.

Howland [7] used the accurate calorimeter of Lusk to demonstrate the specific dynamic effect of protein in two infants, aged 3 and 7 months. He found that additions of 2.14 and 4.27 Gm. of nitrogen to the daily diet of the two infants raised their metabolism 10 and 26 per cent, respectively, above the basal figures in the three hours following the last meal. The calories derived from the combustion of protein rose from 14 to 20 and from 16 to 26 per cent in these experiments.

Murlin and Hoobler [8] measured the heat production of a markedly marantic infant, aged 3 months, following fat, carbohydrate and protein meals with the same energy content. All determinations were made under similar experimental conditions. The heat production was lowest (6.01 calories an hour) following the fat meal. It rose to 7.25 and 7.39 calories an hour in two observations following carbohydrate meals. An increase in the protein content of the last meal from 11 to 30 per cent produced a further rise in metabolism to 8.12 calories an hour. The latter figure represents an increase of 35 per cent more than the value obtained following the fat meal.

Hoobler [9] progressively raised the protein content of the daily diet of an infant from 9.9 to 43.3 Gm., and, on the twelfth day of protein feeding, obtained a maximum rise of 42.4 per cent in the metabolism.

Benedict and Talbot [10] conclude from their observations on twelve infants from 3 to 13 months of age that a meal containing approximately 50 calories may stimulate metabolism for four hours, and that it may remain elevated for as long as nine hours following a larger meal.

Murlin, Conklin and Marsh [11] found that the addition of 24 Gm. of breast milk or lactose to a meal raised the metabolism of new-born infants on an average of 6.8 per cent within the first two hours.

Most authors agree that infants react to the ingestion of food in the same manner as adults. The evidence also favors the theory that only the portion of the protein intake which actually undergoes oxidation within the body contributes to the specific dynamic effect.

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7. Howland, John: Der Chemismus und Energieumsatz bei Schlafenden Kindern, Hoppe-Seyler's Ztschr. **74**:1, 1911.

8. Murlin, J. R., and Hoobler, B. R.: The Energy Metabolism of Ten Hospital Children, Am. J. Dis. Child. **9**:81 (Feb.) 1915.

9. Hoobler, B. R.: The Protein Needs of Infants, Am. J. Dis. Child. **10**:153 (Sept.) 1915.

10. Benedict, F. G., and Talbot, F. B.: Metabolism and Growth from Birth to Puberty, Carnegie Institute of Washington, publication no. 302, 1921, p. 95.

11. Murlin, J. R.; Conklin, R. E. and Marsh, M. E.: Energy Metabolism of Normal New-Born Babies, with Special Reference to the Influence of Food and of Crying, Am. J. Dis. Child. **29**:1 (Jan.) 1925.

APPARATUS AND METHODS

A description of the apparatus and methods appeared in papers I and II of this series.[12] In the present group of experiments, an infant's chamber replaced the larger Benedict cot chamber used for older children. The material and construction of the smaller chamber closely resembled the larger one. It had a capacity of 120 liters and was sufficiently large to accommodate infants up to the age of 2 years.

The construction of the calorimeter bed made possible accurate urinary collections without discomfort to the patient. The frame of stained wood sloped downward from head to foot. A fish net with a ¾-inch mesh was drawn tightly across the top of the frame. It stretched across the lower half of the bed only partially, leaving a central gap which permitted the unobstructed passage of a rubber tube from the genitalia obliquely downward into a bottle in which the urine was collected under oil. A narrow pad enclosed in a rubber jacket and sewed into a thin woolen blanket covered the net and served as a mattress. Observations only rarely were interfered with by urinary losses or by the infant's discomfort.[13]

Professors Fries and Williams suggested a method for controlling the temperature of the chamber which was simpler than the one previously used with the children's chamber and which proved equally as satisfactory. With proper precautions it materially aided in obviating the error resulting from the lag of mercurial thermometers. The infant's chamber was partially immersed in approximately 1,000 liters of water at a temperature of from 15 to 16 C. Early in the preliminary period the infants fell asleep, and they slept throughout all of the observations reported. During this period, which usually lasted from one half to three fourths hours, the temperature of the water jacket was carefully adjusted to the heat production of the subject during sleep so as to maintain a uniform temperature of the chamber. Fluctuations in individual experiments of from two to six hours' duration never exceeded 0.5 and were usually less than 0.2 degrees. The temperature range for the whole series was between 24 and 25 degrees.

The other parts of the apparatus and the methods, including preparation of foods, technic during observations and calculation of results, have been described fully in previous papers.[12]

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12. Levine, S. Z., and Wilson, J. R.: The Respiratory Metabolism in Infancy and in Childhood: I. Basal Metabolism of Children, Am. J. Dis. Child. **31**:323 (March) 1926. Wilson, J. R.; Levine, S. Z., and Rivkin, Helen: The Respiratory Metabolism in Infancy and in Childhood: II. Ketosis and the Respiratory Exchange in Children, Am. J. Dis. Child. **31**:335 (March) 1926.

13. The success of experiments was due in a large measure to the skill of the metabolism nurse, Miss Kelly, in making the infants comfortable and in adjusting the apparatus which was in part devised by her.

TABLE 1.—*Alcohol Checks for Experimental Year (1925-1926)*

Date	Minutes	Alcohol, Gm.	Water			Carbon Dioxide			Oxygen			Respiratory Quotient (0.667)		Heat Theory (Calories)
			Theory, Gm.	Found, Gm.	Error, per Cent	Theory, Gm.	Found, Gm.	Error, per Cent	Theory, Gm.	Found, Gm.	Error, per Cent	Found	Error	
Dec. 21.....	35	....	....	3.29	.....	....	4.31	.....	....	4.68	.....	0.670	.....	.....
	45	....	....	4.79	.....	....	6.19	.....	....	6.93	.....	0.650	.....	.....
	30	....	....	2.35	.....	....	3.38	.....	....	3.33	.....	0.738	.....	.....
	30	....	....	3.04	.....	....	4.12	.....	....	4.68	.....	0.640	.....	.....
Average.....		2.37	3.13	3.37	+ 7.7	4.54	4.50	—0.9	4.95	4.91	—0.8	0.667	±0.0	16.80
Dec. 23.....	45	....	....	4.07	.....	....	6.52	.....	....	7.08	.....	0.670	.....	.....
	45	....	....	3.87	.....	....	6.38	.....	....	7.01	.....	0.662	.....	.....
	50	....	....	4.38	.....	....	6.42	.....	....	6.96	.....	0.671	.....	.....
	40	....	....	4.01	.....	....	6.14	.....	....	6.67	.....	0.670	.....	.....
Average.....		3.30	4.35	4.08	— 6.2	6.30	6.37	+1.1	6.87	6.93	+0.9	0.668	+0.001	23.34
Jan. 6.....	45	....	....	3.74	.....	....	6.36	.....	....	6.86	.....	0.674	.....	.....
	45	....	....	4.34	.....	....	6.47	.....	....	7.09	.....	0.664	.....	.....
Average.....		3.45	4.54	4.04	—11.0	6.59	6.42	—2.6	7.18	6.95	—2.8	0.669	+0.002	24.40
	45*	....	....	4.59	.....	....	5.88	.....	....	6.05	.....	0.707	.....	.....
	45	....	....	5.55	.....	....	6.20	.....	....	6.99	.....	0.645	.....	.....
Average.....		3.23	4.26	5.07	+19.0	6.18	6.04	—2.3	6.74	6.52	—3.3	0.674	+0.007	22.89
Jan. 18.....	45	....	....	4.03	.....	....	5.31	.....	....	5.58	.....	0.692	.....	.....
	45	....	....	4.04	.....	....	5.34	.....	....	5.84	.....	0.665	.....	.....
Average.....		2.81	3.70	4.04	+ 9.2	5.36	5.33	—0.6	5.85	5.71	—2.4	0.678	+0.011	19.87
Feb. 8.....	40	....	....	4.40	.....	....	7.18	.....	....	7.67	.....	0.681	.....	.....
	40	....	....	4.64	.....	....	7.28	.....	....	7.99	.....	0.663	.....	.....
Average.....		3.84	5.06	4.52	—10.7	7.33	7.23	—1.4	8.00	7.83	—2.1	0.672	+0.005	27.17
Feb. 17.....	45	....	....	2.98	.....	....	3.99	.....	....	4.29	.....	0.676	.....	.....
	45	....	....	2.71	.....	....	3.79	.....	....	3.97	.....	0.694	.....	.....
Average.....		2.03	2.67	2.85	+ 6.7	3.87	3.89	+0.5	4.22	4.13	—2.1	0.685	+0.018	14.34
May 5.....	44	....	....	4.54	.....	....	6.58	.....	....	7.06	.....	0.678	.....	.....
	44	....	....	3.86	.....	....	6.14	.....	....	6.64	.....	0.673	.....	.....
Average.....		3.34	4.40	4.20	— 4.5	6.38	6.36	—0.3	6.96	6.85	—1.6	0.675	+0.008	23.64
May 19.....	45	....	....	4.39	.....	....	5.84	.....	....	6.49	.....	0.654	.....	.....
	54	....	....	4.65	.....	....	6.85	.....	....	7.31	.....	0.682	.....	.....
Average.....		3.34	4.40	4.52	+ 2.7	6.38	6.35	—0.5	6.96	6.90	—0.9	0.669	+0.002	23.64
Total average.....			27.71	27.58	— 0.5	46.75	46.45	—0.6	50.99	50.24	—1.5	0.673	+0.006	21.65

* In this observation an electric pad within the chamber raised the temperature to simulate the increased heat production of a crying baby. These figures are not included in the averages.

ALCOHOL CHECKS

The reliability of the observations was controlled by frequent alcohol checks. The results appear in table 1.

The average error for the consumption of oxygen on which heat production is based was —1.5 per cent, the maximum error being —2.8 per cent on January 6. Respiratory quotients averaged 0.673 and ranged between 0.67 and 0.69 for individual experiments as against the theoretical quotient of 0.667. The heat dissipated per hour by the alcohol flame in these checks exceeded the heat produced by the infants in this group by only a slight margin.

REPORT OF CASES

Brief histories of the two normal infants studied follow.

CASE 1.—J. B., a white boy, was found in a vacant apartment on Nov. 18, 1925. The stump of the umbilical cord was still attached. He was admitted to the hospital on November 21. Examination showed a normal new-born infant. The Wassermann and tuberculin reactions were negative. From January 1 to February 11, he was studied in the metabolism ward. He received whole milk dilutions and gained 5 pounds (2,267.9 Gm.) during the three months of his stay in the hospital, his weight going from 9 to 14 pounds (4,082 to 6,350 Gm.).

CASE 2.—C. H., a colored boy, born Dec. 27, 1925, entered the hospital on March 17, 1926. Except for an umbilical hernia and signs of mild rickets, the infant was normal. The Wassermann and tuberculin reactions were negative. During the two and one-half months of his stay in the hospital he received whole milk dilutions and gained 2½ pounds (1,133.9 Gm.). At discharge on June 3, at the age of 5 months, he weighed 13 pounds and 14 ounces (6,293.6 Gm.).

EXPERIMENTAL PROCEDURE

Theoretically, the ideal procedure by which to study the effect of food on metabolism would be to obtain a truly basal determination on each patient without food, together with a determination on the same day following the ingestion of the food under investigation. As a rule, however, infants will not sleep while hungry or when continuously confined in a respiration chamber for more than two hours. For this reason, the infants were given small meals of cow's milk, the first receiving 62 and the second 34 calories, and the observation ending from two to three hours afterward was considered basal for comparative purposes.

The experiments with larger amounts of food were made with one exception (experiment 1) within a few days of the basal determination. In view of the constancy of the basal metabolism,[14] this lapse of time

14. Lusk, Graham; and Du Bois, E. F.: On the Constancy of the Basal Metabolism, J. Physiol. **59**:213 (Oct.) 1924.

probably did not affect the heat production. Gephart and Du Bois [15] have advocated this method as being the most satisfactory for studying the effect of food in normal subjects. This procedure was also used by Lusk [4] in his work with dogs.

Fat, carbohydrate, protein and mixed meals in the form of cream, glucose, casein (Mead's casec) and cow's milk, respectively, were studied. All but three of the test meals contained approximately 125 calories as against the 62 and 34 calories in the meals preceding the basal observations. The exceptions consisted of one meal of glucose containing 80 calories and two of cow's milk containing 100 calories (experiments 1, 16 and 17). Eleven of the thirteen observations ended from two to four hours after ingestion. The remaining two observations on infant C. H. continued for six hours after the test meals.

The reliability of the aforementioned method depends wholly on the control in individual experiments of all factors that might conceivably influence heat production. For this reason, all observations on each infant were made under uniform conditions. The infants slept soundly throughout all determinations, with approximately the same number of adjustment movements.[16]

In all the observations their temperatures were normal. They wore the same clothing and were subjected to the same environmental temperature. The pulse rate showed only minor fluctuations. The fluid content of the meals preceding all observations was the same. These factors, therefore, did not influence heat production, and the variations found in these experiments may be ascribed reasonably to differences in the food previously ingested.

RESULTS

The calorimetric data appear in table 2. Table 3 gives a summary of the results.

BASAL METABOLISM

The basal metabolism of the two normal infants as obtained during sound sleep totaled 56.2 and 55.8 calories per kilogram per twenty-four hours and 42.5 and 41.4 calories per square meter per hour, respectively (experiments 8 and 20, table 3). These values are well within 5 per cent of the standard figures of Benedict and Talbot.[10] As previously noted, the meals preceding the basal observations contained 62 and 34 calories. The former meal may have stimulated the metabolism of the first infant slightly above the true basal level. The energy content of the smaller

15. Gephart, F. C., and Du Bois, E. F.: The Determination of the Basal Metabolism of Normal Men, and the Effect of Food, Arch. Int. Med. **15**:835 (May) 1915.

16. Movements were graphically recorded according to the method of Benedict and Talbot, which was described in previous papers in this series (see footnote 12).

TABLE 2.—*Calorimetric Data in Terms of Averages per Hour*

Case	Date	Weight, Kg.	Surface Area, Sq.m.*	Time of Observation	Carbon Dioxide, Gm.	Oxygen, Gm.	Respiratory Quotient	Nitrogen per Hour, Gm.	Calories per Hour	Pulse, Average	Rectal Temperature F., Average	Movements, Average	Chamber Temperature C., Average	Comment †
1	2/ 3	6.20	0.342	10:55 a.m. to 12:15 p.m.	5.21	4.28	0.84	0.096	14.53	112	98.5	8	23.8	Last meal, 9:51-10:06 a.m.; 61.8 calories; protein, 2.6 Gm.; fat, 2.5 Gm.; carbohydrate, 6.8 Gm.
	1/13	5.65	0.317	12:26 p.m. to 2:41 p.m.	5.28	4.07	0.94	0.061	14.07	112	98.4	—	24.1	Last meal, 10:41-10:53 a.m.; 99.9 calories: protein, 3.3 Gm.; fat, 4.0 Gm.; carbohydrate, 12.0 Gm.
	2/ 1	6.22	0.343	11:30 a.m. to 1:30 p.m.	5.71	4.39	0.95	0.057	15.20	117	98.8	13	23.8	Last meal, 10:16-10:21 a.m.; 125.9 calories: protein, 4.2 Gm.; fat, 4.5 Gm.; carbohydrate, 16.3 Gm.
	1/29	6.02	0.331	11:26 a.m. to 1:29 p.m.	5.47	4.50	0.89	0.075	15.32	116	98.4	8	23.7	Last meal, 10:02-10:14 a.m.; 121.7 calories: protein, 3.9 Gm.; fat, 10 Gm.; carbohydrate, 3.1 Gm.
	1/27	6.22	0.343	11:06 a.m. to 1:06 p.m.	6.04	4.98	0.88	0.168	16.75	120	98.9	17	23.7	Last meal, 9:56-10:04 a.m.; 121.5 calories: protein, 17.7 Gm.; fat, 3.5 Gm.; carbohydrate, 4 Gm.
	1/25	6.14	0.338	11:10 a.m. to 11:55 a.m.	6.44	5.08	0.92	‡	17.27	123	98.9	8	23.6	Last meal, 10:04-10:16 a.m.; same as on 1/27
2	4/21	5.63	0.316	11:45 a.m. to 1:15 p.m.	4.67	3.87	0.88	0.087	13.08	—	98.8	0	25.3	Last meal, 10:07-10:19 a.m.; 34.1 calories: protein, 1.6 Gm.; fat, 1.9 Gm.; carbohydrate, 2.4 Gm.
	4/16	5.67	0.317	11:00 a.m. to 12:45 p.m.	5.10	4.03	0.92	0.061	13.84	—	98.3	5	25.3	Last meal, 9:50-9:55 a.m.; 96.6 calories: protein, 4.5 Gm.; fat, 5.4 Gm.; carbohydrate, 6.8 Gm.
	4/16	5.67	0.317	2:49 p.m. to 4:49 p.m.	5.48	3.97	1.00	§	13.94	—	98.6	8	25.1	Last meal, 2:02-2:15 p.m.; 81.4 calories: protein and fat, 0; carbohydrate, 22 Gm. (glucose)
	4/19	5.68	0.318	11:15 a.m. to 1:18 p.m.	5.58	4.09	0.99	0.069	14.26	—	98.8	1	25.4	Last meal, 10:20-10:25 a. m.; 129.5 calories: protein and fat, 0; carbohydrate, 35 Gm. (glucose)
	4/28	5.75	0.321	3:00 p.m. to 6:00 p.m.	4.74	3.98	0.87	0.058	13.46	—	98.7	1	24.9	Last meal, 2:06-2:12 p.m.; 127.7 calories: protein, 1.5 Gm.; fat, 12 Gm.; carbohydrate, 2.3 Gm.
	4/23	5.82	0.323	11:30 a.m. to 1:30 p.m.	5.31	4.22	0.91	0.038	14.53	—	99.0	1	25.4	Last meal, 10:21-10:41 a.m.; 121.5 calories; protein, 5.8 Gm.; fat, 7 Gm.; carbohydrate, 8.8 Gm.
	4/26	5.77	0.321	11:26 a.m. to 1:26 p.m.	5.64	4.78	0.86	0.140	16.03	—	99.2	0	25.0	Last meal, 10:14-10:25 a.m.; 121.5 calories: protein, 28.5 Gm.; fat, 0.5 Gm.; carbohydrate, 0

* Derived from figures of Benedict and Talbot (Carnegie Inst. of Wash., no. 302, 1921, table 15, p. 62).
† The children slept throughout all observations.
‡ Calorimetric specimen lost. Figure of 0.168 Gm. for urinary nitrogen per hour used. (Obtained on 4/27 under similar conditions.)
§ Calorimetric specimen lost. Calculation made on assumption that 15 per cent of total metabolism was derived from protein.

meal did not exceed the maintenance requirement of the second infant for the period of observation and probably did not stimulate the metabolism appreciably in the three hours after ingestion.

SPECIFIC DYNAMIC ACTION OF FOOD

For clearness of presentation, this portion of the paper will be considered under the following sections: (1) mixed meals; (2) fat meals; (3) carbohydrate meals; (4) protein meals; (5) duration.

Mixed Meals.—Meals of dilutions of cow's milk containing 62, 100 and 126 calories resulted in the production of 42.5 (basal), 44.4 and 44.3 calories per square meter per hour by the first infant (experiments 8, 1 and 7, table 3). Similar meals containing 34, 97 and 122 calories resulted in the production of 41.4 (basal), 43.7 and 45 calories per square meter per hour by the second

TABLE 3.—*Summary of Results—Average of Periods*

Case	Experiment No.	Date	Last Meal: End Observations, Minutes Following Meals	Last Meal: Total Calories	Calories: Per Kg. per 24 Hours	Calories: Per Square Meter* per Hour	Rise Above Own Basal in per Cent: Per Kg.	Rise Above Own Basal in per Cent: Square Meter	Last Meal in Grams
1	8	2/ 3	136	62	56.24	42.5	Basal		W. M., 60; farina, 5; water, 107
	1	1/13	234	100	59.77	44.4	+ 6.3	+ 4.5	W. M., 100; D. M., 7.5; water, 30
	7	2/ 1	191	126	58.65	44.3	+ 4.3	+ 4.1	W. M., 110; D. M., 7.5; farina, 5; water, 57
	6	1/29	201	122	61.08	46.3	+ 8.6	+ 8.2	W. M., 50; casec, 2; cream (40%), 20; water, 97
	5	1/27	186	122	64.63	48.8	+14.9	+14.8	W. M., 80; casec, 17; water, 97
	4	1/25	105	122	67.50	51.1	+20.0	+20.2	Same as 1/27
2	20	4/21	182	34	55.76	41.4	Basal		W. M., 47; water, 94
	16	4/16	172	97	58.58	43.7	+ 5.1	+ 5.6	W. M., 135; water, 45
	17	4/16	160	81	59.93	44.0	+ 5.5	+ 6.3	Glucose, 22; water, 180
	23	4/28	231	128	56.18	41.9	+ 0.8	+ 1.2	W. M., 30; cream (40%), 29; water, 90
	18	4/19	175	130	60.25	44.8	+ 8.1	+ 8.2	Glucose, 35; water, 180
	21	4/23	179	125	59.92	45.0	+ 7.5	+ 8.7	W. M., 175
	22	4/26	186	122	66.67	49.9	+16.4	+17.0	Casec, 32; water, 180

* From figures of Benedict and Talbot (footnote 10, table 15, p. 62).

infant (experiments 20, 16 and 21, table 3). Thus, a twofold increase in the total calories of the milk meal stimulated the metabolism of the first subject approximately 4 per cent above the basal level on two occasions. Likewise, threefold and fourfold increases in the caloric intake stimulated the metabolism of the second patient 6 and 9 per cent above the basal values.

The results indicate that infants react to food by an elevation of metabolism as adults do. They confirm the conclusions of Benedict and Talbot[10] that the standard figures for the basal metabolism of infants, as measured by present methods, are actually from 5 to 10 per cent above the true basal values.

Fat Meals.—The meals consisted of mixtures of cream and whole milk and contained from 10 to 12 Gm. of fat and from 122 to 128 calories. The heat production of the two infants following these meals was 46.3 and 41.9 calories per square meter per hour, respectively (experiments 6 and 23). These values represent increases of 8 and 1 per cent above the basal figures of the two infants. Part of the 8 per cent increase in case 1 may have resulted from the higher protein content of the test meal when compared with the basal meal.

The fat meal had no appreciable effect on the metabolism in case 2. The latter result is of greater value for comparative purposes, as the other constituents of both test and basal meals were identical. The results are in accord with those of Murlin and Hoobler [8] and of other observers working with adults [17] that of all foodstuffs, fat stimulates metabolism the least.

Carbohydrate Meals.—Meals of pure glucose and of cow's milk with approximately the same energy content stimulated the metabolism of infant C. H. to the same degree. The former meals contained 81 and 130 calories; the latter meals contained 97 and 122 calories. In two observations ending three hours after the ingestion of the smaller and the larger glucose meals, the heat output was 44 and 44.8 calories per square meter per hour (experiments 17 and 18). In comparable observations following the meals of milk, the heat output was 43.7 and 45 calories per square meter per hour (experiments 16 and 21). Therefore, the pure carbohydrate meals had essentially the same specific dynamic action as the mixed meals (6 and 8.5 per cent).

Protein Meals.—The most marked stimulation of metabolism occurred following the protein meals, which is in accordance with the results of all other workers. An increase in the nitrogen intake from 0.4 to 2.8 Gm. in the form

TABLE 4.—*Heat Production After Food—Individual Periods*

Experiment No.	Last Meal		End of Observation in Minutes Following Meals	Calories per Hour	Movements
	Calories	Type			
22	122	Protein	126	15.9	0
			186	16.2	0
			246	15.9	15
			306	17.2	20
			366	18.3	20
21	125	Mixed	120	14.8	0
			180	14.2	1
			225	13.9	0
			271	13.9	0
			315	14.7	0
			360	15.7	0

of casein (casec) raised the metabolism of case 1 from 42.5 to the high figures of 48.8 and 51.1 calories per square meter per hour in two observations (experiments 5 and 4). In case 2, an increase in nitrogen from 0.3 to 4.6 Gm. raised the metabolism from 41.4 to 49.9 calories per square meter per hour (experiment 22). The heat production, therefore, rose 15, 20 and 17 per cent above the basal values in the three instances in response to meals containing 122 calories but which were excessively high in protein. The percentage of calories derived from the combustion of protein rose from 11 to 26 in the one observation in the first case in which the collection of urine was satisfactory. Similarly, 23 per cent of the total calories produced by the second infant was derived from the combustion of protein. Although the nitrogen intake of the second infant was notably higher than that of the first infant, the protein actually metabolized by both as calculated from the urinary nitrogen was approximately the same (0.140 and 0.168 Gm.). This fact may explain the similar effects of both meals. The results agree closely with those of Howland.[7]

Duration of Specific Dynamic Action.—We were able to measure the metabolism of infant C. H. continuously for six hours following both a high protein meal (casec) and a meal of mixed composition (cow's milk). The infant slept soundly throughout the observations with only an occasional movement. The results appear in table 4.

17. Wang, C. C.; Strouse, S., and Saunders, A. D.: Studies on the Metabolism of Obesity: III. The Specific Dynamic Action of Food, Arch. Int. Med. **34**:573 (Oct.) 1924.

Both meals had already begun to stimulate the metabolism two hours after ingestion, and this effect persisted throughout the six hours of the observations. In both instances the metabolism was rising when observations were terminated, the values in the sixth hour being, respectively 15 and 6 per cent higher than in the second hour. These results are consistent with those of Benedict and Talbot.[10]

SUMMARY AND CONCLUSIONS

The effect of food on the metabolism of two normal infants, aged 3 and 4 months, was studied in thirteen carefully controlled calorimetric observations of from two to six hours' duration.

The basal metabolism of these infants as obtained during sound sleep and from 2 to 3 hours following small meals of cow's milk containing 62 and 34 calories, respectively, equalled 42.5 and 41.4 calories per square meter per hour.

A study was made of the specific dynamic action of fat, carbohydrate, protein and mixed meals. They consisted of cream, glucose, casein (casec) and cow's milk, respectively, and contained approximately 125 calories. The fat, milk and protein meals raised the metabolism of one infant 8, 4, and 15 per cent above the basal level. The other infant reacted to the fat, milk, glucose and protein meals by respective increases of 1, 9, 8 and 17 per cent above the basal level in the three hours after ingestion.

The specific dynamic action of large milk and protein meals was already present two hours after ingestion and in two satisfactory observations persisted unchecked at the end of six hours.

A SIMPLE DRESSING FOR THE BREASTS OF MOTHERS OF THE NEWLY BORN *

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Relief of discomfort and avoidance of pain should be two aims in the art of the practice of medicine. In the cycle of life, the female of the species undoubtedly has the harder rôle. If she can be spared any of the agony to which she is subjected it is inhuman not to help her. The lot of the woman, it must be admitted, is hard and not enviable. She must go through nine months of uncertainty, facing an ordeal through which she may or may not already have passed, knowing that many women are incapacitated and that some do not survive. It is true that much has been done and is being done to assist her in child-bearing, but no matter what relief is afforded there still remains much mental anguish and physical pain.

The physical pain does not by any means cease after the delivery of the child, nor does the mental anguish become lessened, because of the uncertainty of the well being of the infant owing to the ordeal that it has passed through. On account of the eclipsing climax that has just been passed, little attention is paid to a certain feature of the postpartum period, namely, the evolution of the nursing breast, until trouble begins or already has taken place. The mother must then go through some additional discomfort and pain incident to fissured nipples, caked breasts, and not infrequently abscessed breasts, with the further disappointment at times of the inability to nurse the infant, an anticipated pleasure of most mothers. When it is realized that this feature of pain, suffering and disappointment can be eliminated easily the burden of the woman will be somewhat lightened at least.

With the inauguration of my service of the newly born at the Touro Infirmary, it was realized that the supervision of the food supply was essential if the proper start was to be given the infant, and the care of the breasts was therefore designated as the responsibility of the pediatrician. This afforded an opportunity to study the evolution of the mother's breasts as a functioning organ from the time of the delivery of the child with a view to conserving its milk supply. During this investigation, it was found that with the relief of pain during the procedure, the mothers took more readily to nursing their infants, and the infants were given the best possible start. The pain experienced by a mother when an infant is sucking a fissured nipple is second only

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* From the Pediatric Division of Touro Infirmary and the Department of Pediatrics of Tulane University of Louisiana.

to the pain of labor, though it is not so easily forgotten, and it requires an heroic mother to continue nursing an infant under such circumstances. The caked breast is also an excruciatingly painful condition, and the abscessed breast is a terrible penalty for a mother to pay.

It is not the intention at this time to go into the care of the nursing breasts but to demonstrate the dressing of the breasts, which in a period of five years has resulted in affording much comfort to the mothers. During this period not a single case of fissured nipples or of caked or abscessed breasts has occurred in the cases in which the dressing has been applied.

For many years before the inauguration of the service of the newly born and before the care of the breasts of the nursing mothers was entrusted to me, many difficulties presented themselves while I was attempting to give to the newly born infant a proper start. The responsibility of feeding was placed with me, but I had no control over the food supply; it was much like being asked to give a banquet and not being permitted to order the food. Sometimes everything went along nicely; at other times the infant was not allowed to nurse because of a caked breast, a fissured nipple or an abscessed breast, or because the mother had fever, or for many other reasons. I saw so many breast binders applied in various and sundry ways; I saw so many breasts massaged for the purpose of removing fictitious "lumps in the breast"; I saw so many icebags and hot fomentations applied to the breasts; in fact I saw so many things being done that I wondered why nature was so cruel to the mother who already had just passed through the terrible ordeal of childbirth. I longed for the opportunity of shouldering the responsibility of the care of the breasts. Through the sympathetic attitude of the late superintendent of the Touro Infirmary, Mr. A. B. Tipping, and the cooperative spirit of the chief of the department of obstetrics, Dr. J. W. Newman, the control of the source of the food supply of the newly born infants in the free service of the hospital was assigned to the pediatric division. I had had the opportunity of observing the various methods of the care of the breasts in many institutions and was particularly impressed with the possibilities of a bandage of adhesive plaster, which was introduced in the Touro Infirmary by Dr. Walter Levy of the obstetrical staff, who in turn had brought it from Dr. C. F. Jellinghouse of the New York Lying-in Hospital. The bandage did not, however, seem to fulfil all the requirements that I thought it should, especially the prevention of pain. After I experimented with various methods, the present bandage or dressing of the breast was evolved.

The object of the dressing is to hold the breasts perpendicular to the chest wall and pointing directly in front of the mother so that they are merely supported in this position with a minimum of pressure being

made against the chest wall, that is, the breast not being pressed down. In this way there is no compression of the mammary glands, no obstructions to any of the ducts and no twisting of the nipples; hence the milk may be secreted without restriction and may be allowed to flow freely without obstruction, and the natural leakage of the excess milk may take place in a normal way.

The time that the dressing should be applied is an important point in its success. During the evolution of the nursing breast from the fourth to the sixth day, usually the fifth day, it becomes firm and painful. This is usually just before the milk secretion becomes plentiful, and it is at this time that the dressing should be applied. Sometimes it is advisable to apply it the day before. In this instance, however, caution should be exercised in strapping the breast, allowance being made for the further normal swelling. The period of usefulness of the dressing is until after the seventh to the ninth day, usually the eighth day. Some of the mothers wish to allow the dressing to remain longer, and some, after it is removed, ask to have it reapplied. The only adverse criticism to the dressing is the discomfort incident to its removal, but the longer it is allowed to remain on the less is this discomfort. Incidentally, this dressing is of advantage in many instances during the process of weaning, and is of decided value for those mothers whose infants die at birth. In the latter instances, the application of the dressing rather snugly on the first day will allow the mother a minimum of discomfort during the evolution of the functioning breast.

METHODS OF APPLICATION

The various steps in the application of the dressing are as follows:

1. The head of the patient is lowered to the level of the body in a horizontal position (fig. 1).

2. The arms are extended above the head and in the same plane with the body (fig. 2). This tends to bring the breasts in the proper position. In the instance of unusually large breasts, it becomes necessary for an assistant to hold the breasts gently in position. This is best accomplished by having the assistant on the opposite side from the operator and at the head of the bed, with the right hand supporting the right breast and the left hand the left breast.

3. The first strap (fig. 3) is applied below the breasts, extending from the side opposite the operator to the side near the operator. The lower edge of this strap should be just below the lower margin of the breasts.

4. The second strap (fig. 4) is then applied in like manner but above the breasts. The upper edge of this strap should be just above the upper margin of the breasts.

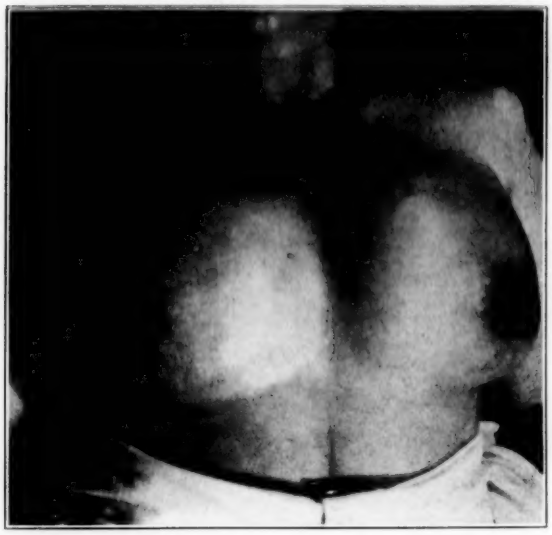

Fig. 1.—First step in application of dressing.

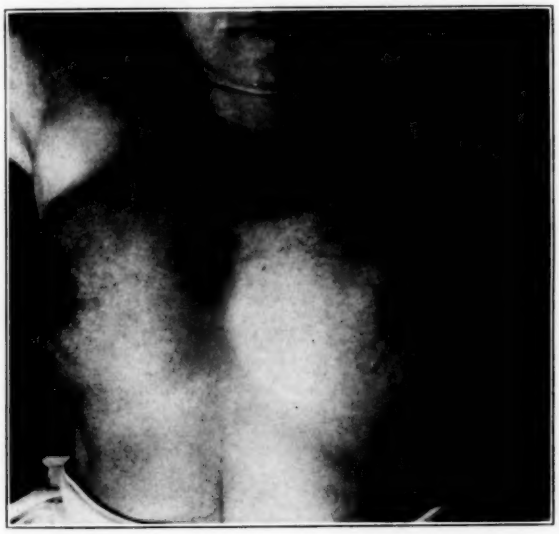

Fig. 2.—Patient's arms extended above the head and in same plane with the body.

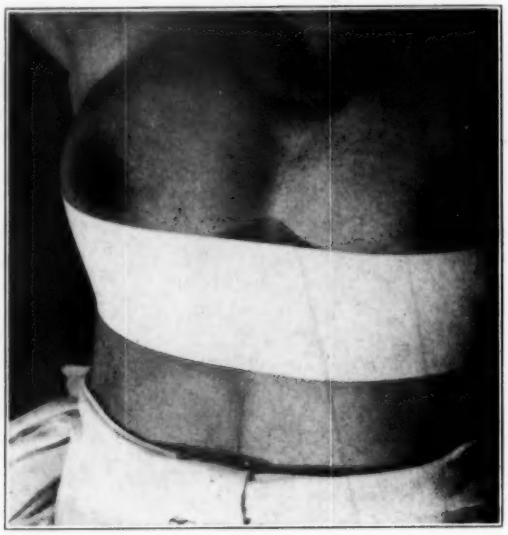

Fig. 3.—Application of first strap.

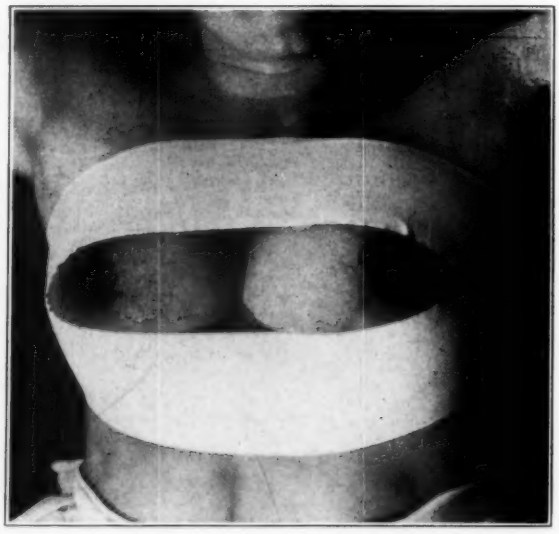

Fig. 4.—Second strap applied like first strap but above the breasts.

Fig. 5.—Third strap extended from beneath one breast to above the other breast.

Fig. 6.—Fourth strap applied in manner similar to third strap, but in the opposite diagonal.

Fig. 7.—Fifth strap applied in median line extending from below upward.

Fig. 8.—Profile view showing perpendicular position of the breast from the chest wall.

5. A third strap (fig. 5) should be extended from beneath one breast just where it ordinarily would fold, to above the other breast, and attached to the lower and upper straps so as to suspend the breast and prevent a folding of it.

6. A fourth strap (fig. 6) is applied in a manner similar to the third strap but in the opposite diagonal.

7. Finally, a fifth strap (fig. 7) is applied in the median line extending from below upward. Figure 8 is a profile view showing the perpendicular position of the breast from the chest wall. This strap gives support so as to prevent the dressing from folding further.

The width of the adhesive straps varies, depending on the size and character of the breasts to which it is to be applied; the lower strap usually is about 3¼ inches wide. The upper one may be ¼ inch narrower than the lower one. Straps 3 and 4 should be about 2 or 2¾ inches wide and strap 5 about the same width.

The thickness of the adhesive straps also may vary depending on the size and character of the breasts; usually a single thickness is all that is necessary but at times in the larger and more pendulous breasts a double thickness will suffice. Occasionally in the extremely large and pendulous breasts, a triple thickness is necessary.

PYOPNEUMOTHORAX IN INFANTS

A REPORT OF TEN CASES COMPLICATING PNEUMONIA *

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This study will be confined to ten infants who developed pyopneumothorax spontaneously during the course of an attack of pneumonia. The pulmonary lesion in each instance was a bronchopneumonia secondary to bronchitis or disease of the upper respiratory tract, but not to any of the acute infectious diseases of childhood, such as whooping cough, diphtheria or measles.

The literature on pyopneumothorax complicating bronchopneumonia in infants and in young children is meager. I am certain, however, from my experience with pyopneumothorax at the Babies' Hospital that this disease in infants is not so rare as the literature would indicate: it is often not recognized. There have been fifteen children under 3 years of age in the hospital with the disease in the past sixteen years, but twice as many were recognized as having pyopneumothorax in the past four years as in the previous twelve.

Huber and Hirsch [1] reported a case of an infant, aged 7 months, who had a history similar to the infants reported in this study, but it would have been rejected in this series because two exploratory needle punctures had been made before the diagnosis was positively ascertained. This case is particularly interesting, however, because at necropsy the same pathologic conditions were found as in the three cases reported in this paper.

Patients were included in this study only if they were proved to have pyopneumothorax. The bases for the proof were necropsy, the roentgen ray, or the fact that, at the time of needling, the plunger of the syringe was blown out by air under pressure in the chest. All had been suspected of having air in the chest before any paracentesis was done. If there was a previous puncture, the case was excluded.

The ages of the infants in this group range from 1 month to 3 years. The series is unique in that two of the infants were only 1 month old.

Only two of the patients at the time of admission to the hospital had pyopneumothorax. The history of one of these (case 7) strongly suggested that the disease had begun suddenly with cyanosis and dyspnea,

* Received for publication, Dec. 15, 1926.

* From The Babies' Hospital, the Department of Diseases of Children, College of Physicians and Surgeons.

1. Huber, Francis; and Hirsch, I. S.: Pneumothorax: A Clinical and Radiographic Study, Arch. Pediat. **27**:1 (March) 1910.

three days before admission. Only one other patient (case 1) entered with the signs of a pyopneumothorax. The cyanosis and dyspnea had developed gradually for several days prior to admission.

The length of time that elapsed from the onset of the pneumonia to the development of the pyopneumothorax could be determined with fair accuracy in eight instances. The shortest was four days and the longest twenty-five, making an average for the eight of ten and one-half days. In all, the diagnosis of pneumonia had been made clinically or by the roentgen ray before the onset of the pyopneumothorax.

The records, except in case 7, would seem to refute the general opinion that the symptoms are so sudden and so threatening that the onset can be determined at a definite time. Eight of the patients developed the pyopneumothorax in the hospital under observation, and in no instance is it recorded in the histories that any sudden change took place in the child's condition, but rather that the diagnosis was made only on routine examination. There are instances, well illustrated in cases 7, 8, 9 and 10, in which it would seem that the pyopneumothorax was probably present before the usual signs (coin, sound and succussion) could be elicited. This is probably the result of two factors: either large amounts of fluid had accumulated in the pleural cavity before the entrance of air, or there were adhesions between the visceral and parietal pleurae, so that the pyopneumothorax was at first localized. These conditions would limit the extent of the air until there was a large quantity under greater pressure.

The symptoms of air developing in the pleural cavity in infants are not characteristic. When, however, an infant with pneumonia suddenly becomes cyanotic and dyspneic, the entrance of air in the pleural cavity certainly should be considered, and although these symptoms are found in other conditions, notably in pericarditis, they are almost always present in pyopneumothorax. They are important points in diagnosis in conjunction with physical signs, but are not conclusive alone.

PHYSICAL SIGNS

Inspection.—Obliteration of the interspaces was observed only once (case 6). Limited expansion of the affected side, however, was usually present. The affected side was said in two cases to be bulging. In the other eight, this is not mentioned and probably is not a constant sign.

The character of the respiration offers nothing characteristic or suggestive. The children do not breathe differently from those having pneumonia, except that, when the air is under greater pressure or when the onset is sudden and extreme, the dyspnea and accompanying cyanosis are more marked. I have seen just as great cyanosis, however, with empyema, pericarditis with effusion or extensive pneumonia. The breathing may or may not be more shallow.

Palpation.—The absence of tactile fremitus means fluid or air or both in the pleural cavity. There are only a few physicians whose sense of touch is sensitive enough to make the sign of value. Statistics taken from the histories on this point are too unsatisfactory to report, and the personal equation was too great to warrant any conclusions.

Percussion.—One is led to believe that tympany is the characteristic note when there is air in the pleural cavity. In the type of pneumothorax due to rupture of an emphysematous bleb without infection in which there is a valve-like opening causing the air to be under great pressure, this is probably always true. However, in pyopneumothorax complicating pneumonia in infants, this is not my experience. I will review the ten cases in their relation to this point because of its great importance. In cases 1 and 10, the note was described as tympanic. In the former this was true only over the upper part of the chest, while in the latter it was true over the entire side affected. In cases 4, 5, 6 and 7, the note was described as hyperresonant, that is, an exaggerated normal note. In cases 2, 3, 8 and 9, the percussion note was found to be dull or flat, such gradation as one finds in bronchopneumonia on the one hand and in fluid on the other. This was true even when the diagnosis of pyopneumothorax had been made. In explanation, it can only be stated that the solidified lung and the presence of fluid, sacculated in the meshes of pleural bands in the pleural cavity, masked the note that one would have expected in the presence of air.

To show how difficult it is to determine by percussion the pathologic condition in the chest, the patients may be divided into three groups: (1) those with small amounts of fluid and a great deal of air; (2) those with small or moderate amounts of fluid and air, and (3) those with a large amount of fluid and little air. One would expect the percussion note to be tympanic in the first group; less tympanic or hyperresonant in the second and dull but not necessarily tympanic in the third. But this was not the case. In cases 2 and 3 in which the note was dull or flat, there was a small amount of fluid. Case 2 is particularly important, because a possible reason for this was found at necropsy. The pus was enmeshed in the thick fibrinous exudate on the pleurae. There were many pleural adhesions which caused sacculation of air and pus and which also kept the solidified lung closer to the chest wall.

Shifting dulness was noted only in case 7. This is said in the literature to be an important sign when air and pus are both present. The necropsy material suggests that in infants there is so much pyogenic membrane and so many adhesions that the fluid cannot shift easily with change in position of the patient.

Auscultation.—This concerns itself with the following topics: type of breathing, coin test, succussion, metallic tinkle and friction rubs. The first intimation one may have that one is dealing with pyopneumothorax

is the widespread diminution or absence of breath sounds. This sign always suggests air, or air and pus, in the chest. Other conditions may give areas of suppressed breathing, but rarely is this universal over an entire lung. Empyema or hydrothorax gives diminished breath sounds, but usually never so widespread or so striking as in pyopneumothorax. This sign was present in all the cases, and of all physical signs in infants it is probably the most important and the most often present.

The character of the breath sounds probably depends on several factors: the size of the tear in the lung, the freedom of the communication with the bronchus and the condition of the lung itself. The sounds are never vesicular, but are usually amphoric, cavernous or distant bronchial. Six of the ten patients in this series had amphoric breathing on the affected side. One infant showed bronchovesicular and another distant cavernous breath sounds. In two children breath sounds could not be heard at all. Three of the children who had amphoric breathing showed at necropsy a free communication of the pleural cavity with a bronchus.

It is interesting to find that only about one half of the children had the coin sound. One record is not accurate on this point, so it must be discarded. Six out of the nine others had a definite coin sound, while two did not, and in one there was some doubt. The two who positively did not give the coin sound were two of the youngest, aged 1 and 2½ months, respectively. They both had air in the chest, proved in the first case by necropsy, and in the second by a conclusive roentgenogram. In the child aged 1 month, probably the sacculation of the air, the result of the many adhesions found at necropsy, rendered conditions unfavorable. Probably to obtain a coin sound an unobstructed, relatively large cavity is necessary.

Succussion seems to be of less frequent occurrence than the coin sound. It was positively found in four of the ten cases (1, 6, 8 and 10). In case 2, the absence of the succussion test was fairly easily explained, because the fluid was thick and held in a thick fibrinous exudate of the pleurae. In case 3, the roentgenogram showed little fluid. This child died the third day after admission, so that fluid probably did not develop in sufficient quantity to give succussion. In case 4, the roentgenogram showed a well marked pyopneumothorax with little fluid, but at an operation on the same day, 2 or 3 ounces (59.2 or 89 cc.) of pus was removed. Apparently, the conditions (air and pus in a cavity) were perfect for succussion, and yet it could not be elicited. In case 5, an infant only 4 weeks old developed pyopneumothorax during the first twelve hours in the hospital and died within twenty-four hours, probably before much fluid could accumulate. In case 9, as in case 4, the conditions were right for succussion. From this child's chest, 25 cc. of pus was removed with much air, and yet no splash was made out. The

pyopneumothorax was probably only 24 hours old when the operation was done. The evidence would indicate that the succussion test is not present until three days after the entrance of air and infection into the pleural cavity.

Metallic tinkling was present in six of the ten infants. Usually this sign is the result of râles in the bronchi transmitted through the air in the pleural cavity acting as a resonance box. Two children, however, had râles that could be heard without the tinkling tone. It was present oftener than the succussion sound and as often as the coin sound. Its great value as a sign is the result of its early occurrence. Combined with suppressed breathing, this sign was the first suspicion of pyopneumothorax in these six cases. Pleural friction rubs were not mentioned in the histories of any of the cases.

The heart was displaced more when the pyopneumothorax was on the left side than when on the right. In case 5, with involvement of the left side, the point of maximum impulse was found in the fifth interspace, 0.5 cm. inside of the right nipple line. When pushed to the left, the greatest displacement was in case 1, in which the point of maximum impulse was found in the sixth interspace, 2 cm. beyond the nipple line. In four instances the heart was displaced only a little or not at all. In cases 3, 4 and 10, the roentgenogram showed displacement that was not suspected clinically.

There is, in this study, definite evidence that the liver is pushed downward in right sided pyopneumothorax. In two cases of right sided pneumothorax (cases 8 and 9), the livers on admission were not felt in one and were just palpable in the other, but after the development of the pyopneumothorax they were pushed downward, 6 and 5.5 cm., respectively.

All but one of the ten children had needle punctures to prove the diagnosis, and only in case 7 did emphysema of the subcutaneous tissue develop. This extended from the needle puncture just below the scapula to the sternum in front and to the clavicle above. It subsided in a few days without untoward effects. This child had air in the chest under great pressure.

If the child is sitting up, the roentgenogram is almost always unmistakable and the most important aid in diagnosis. The lung is partially or entirely collapsed against the vertebral column. The absence of shadow, at least in the upper portion, and the horizontal fluid line, indicating the height of fluid, are characteristic. When small amounts of fluid are present, there is merely an obliteration of the costal-diaphragmatic angle. The heart and mediastinum are pushed to the opposite side. As most roentgenograms of infants are taken lying down, the diagnosis of pyopneumothorax is frequently missed. This is particularly true when there are considerable amounts of fluid or when there is a thick-

ened pleura. This is well illustrated in case 10. The roentgenologist did not report any pyopneumothorax, but interpreted the roentgenogram to mean only the presence of fluid. The amount of fluid was so great and so distributed that the border of the lung could not be made out. A thick fibrinous exudate blurred the outline of the lung still further. Tracing the outline of the trachea and bronchi in the roentgenogram is a helpful aid in determining the amount of displacement of the mediastinum. The child must be held so that the spine is straight and in the midline.

In all the patients, a culture was obtained from the pleural exudate. *Staphylococcus aureus* was found in five, pneumococcus type 4 in two, pneumococcus type 3 in one, and pneumococcus not typed in two (old cases). Conclusions regarding the relation of the organism to the severity of prognosis of the infection could not be drawn from the records.

The blood counts in all the children except one showed a leukocytosis. Only the blood counts taken at the time the diagnosis of pyopneumothorax was made are recorded. The four infants, aged from 1 to 8 months, had counts of 23,700 white blood cells with 56 per cent polymorphonuclear leukocytes. In the six children whose ages ranged from 17 to 36 months, the averages were 26,600 and 80 per cent, respectively. This illustrates what is generally found in infants under 1 year suffering from pyogenic infections, i. e., the polymorphonucleosis is much less marked than in those over 1 year of age.

The Pirquet or intracutaneous tuberculin tests were negative in all ten infants.

PROGNOSIS

The prognosis in this condition is grave at any age, but particularly so in young infants. Three of the ten infants were discharged as cured. Their ages were 6, 17 and 26 months, respectively. When the high mortality in empyema in young infants is considered, the recovery of the infant, aged 6 months, in case 10, is notable. After this infant had nearly recovered, a recurrence of the pyopneumothorax necessitated another operation. This is the youngest infant on record, as far as I can find, recovering from pyopneumothorax. Of the five under 1 year of age, four died and one recovered. Of the five over 1 year of age, three died and two recovered. The series is too small to establish statistics, but when the results in empyema in this hospital are compared, the general conclusion may be drawn that infants with pyopneumothorax complicating pneumonia do much worse than older children and adults. Of the infants who died, the four under 1 year of age died on an average of two days after the pyopneumothorax developed, while the three who were over 1 year of age survived twenty-seven days.

The prognosis in infants is made worse by the difficulty in feeding and their great susceptibility to infection. For instance, one of the children, aged 24 months, had nearly recovered. His wound was healed, and the temperature was normal, but enterocolitis developed and caused his death. The prognosis depends more on early and adequate drainage than on any other one thing. If the positive intrapleural pressure is relieved the lung can expand, and resolution of the pulmonary lesion is aided. If, as in empyema, the lung remains collapsed and becomes carnified, the infants probably cannot recover.

DIFFERENTIAL DIAGNOSIS

In differential diagnosis, massive pleuropneumonia, tuberculous pneumonia, pulmonary emphysema, empyema, diaphragmatic hernia and congenital atelectasis must be considered. The differential diagnosis is sometimes made difficult by two or more conditions existing in the same patient.

A pleuropneumonia is usually more difficult to distinguish from an empyema than from a pyopneumothorax. This difficulty is most often found in young infants and is well illustrated in one of the children aged 1 month (case 2). On the day of admission, three physicians believed that the infant had pneumonia at the right base, because of dulness, râles, suppressed bronchial breathing and increased vocal fremitus. The next day they thought that pneumonia was still present, but suspected empyema. There was flatness over the entire right lung, with suppressed breathing; the breath sounds were slightly amphoric in quality, and there were râles in the axilla. The point of maximum impulse seemed slightly displaced to the left. Two days later two physicians found signs suggesting pyopneumothorax. The next day the signs had changed, and both examiners thought that the condition was bronchopneumonia. At necropsy a pyopneumothorax was found. The chest signs in this infant aroused a great deal of interest, and during life no one would positively state that he believed there was air or pus in the chest. Tympany, succussion, coin sound or tinkling were not found at any of the examinations. A roentgen-ray examination would probably have cleared up the diagnosis, but unfortunately this was not obtained.

In adults, tuberculous cavities of the lung have given the signs of pyopneumothorax. Osler [2] found a coin sound in a patient with a tuberculous cavity, and succussion has been found by others. I have never encountered this difficulty in infants. A positive tuberculin test and tubercle bacilli in the sputum would differentiate. A roentgenogram taken with the patient sitting up would help.

The danger emphasized by Skoda, of calling the hyperresonant note over the unaffected lung in pleurisy and pneumonia pneumothorax, may easily be excluded, if borne in mind.

2. Osler, William: Montreal M. J. **24**:969, 1895.

Simple empyema in infants is more often mistaken for pyopneumothorax than any other pathologic condition. The main reason for this is its great frequency compared to pyopneumothorax. If the examining physician would bear in mind the possibility of pyopneumothorax he would proceed to make the further examinations necessary. The routine tests for pyopneumothorax should be made in every case in which the chest is affected, and in which the breath sounds are not well heard over a large part of the lung. Hyperresonance and amphoric or cavernous breathing with great displacement of the heart must also be emphasized. The most suggestive of these signs is the absence of great diminution in the loudness of the breath sounds. If this is true all over the lung, it is extremely suspicious. If the note is hyperresonant or tympanic, the condition could not be caused by fluid alone. Flatness, however, suggests fluid but does not rule out air. Succussion, coin sound and tinkling, if present, make the diagnosis certain, except in some unusual cases of cavity of the lung. An exploratory needle usually gives the necessary information, unless the fluid and air are sacculated and the needle fails to enter the sac. A roentgenogram taken with the child in an upright position is the most accurate diagnostic agency available. Fluoroscopy is also of inestimable value, because the level of the fluid may be watched with the child in different positions. In empyema, gravitation of the fluid would not take place.

The cyanosis that may accompany diaphragmatic hernia combined with the tympany over the hernial contents and the suppressed breathing over the crowded lung offers, sometimes, a formidable difficulty in diagnosis. The symptoms, except for attacks of cyanosis, are usually digestive. When the hernia is constricted or twisted, forcible vomiting accompanied by pain occurs. Temperature and blood changes suggesting infection usually are not seen. If the condition is suspected, a roentgen-ray examination after a barium meal with the child suspended by his feet will usually make the diagnosis clear. Case 3 illustrates the difficulties in diagnosis.

Again, in congenital atelectasis, there is usually no history of infection. The baby is debilitated and may be somewhat cyanotic. The signs over the lungs are usually bilateral, with dulness and feeble breath sounds with or without râles. The characteristic signs of pyopneumothorax (succussion, etc.) are absent. For the reason that young debilitated infants often have severe infections with normal or subnormal temperature and normal blood counts, the diagnosis is not easily made. The cyanosis will disappear or decrease if the child is made to cry. The roentgen-ray examination will clear up the doubt if the child is placed in an upright position.

TREATMENT

The treatment requires early diagnosis and operation. When these infants are operated on, the amount of pus evacuated is usually much more than was suspected. Even if the level of the fluid is not high and the air seems to occupy most of the pleural cavity in the roentgenogram, the amount of pus evacuated at operation will be found large. For this reason and to relieve the pressure of the air, it is imperative to operate early, even if pus is not obtained with an aspirating needle. In case 4,

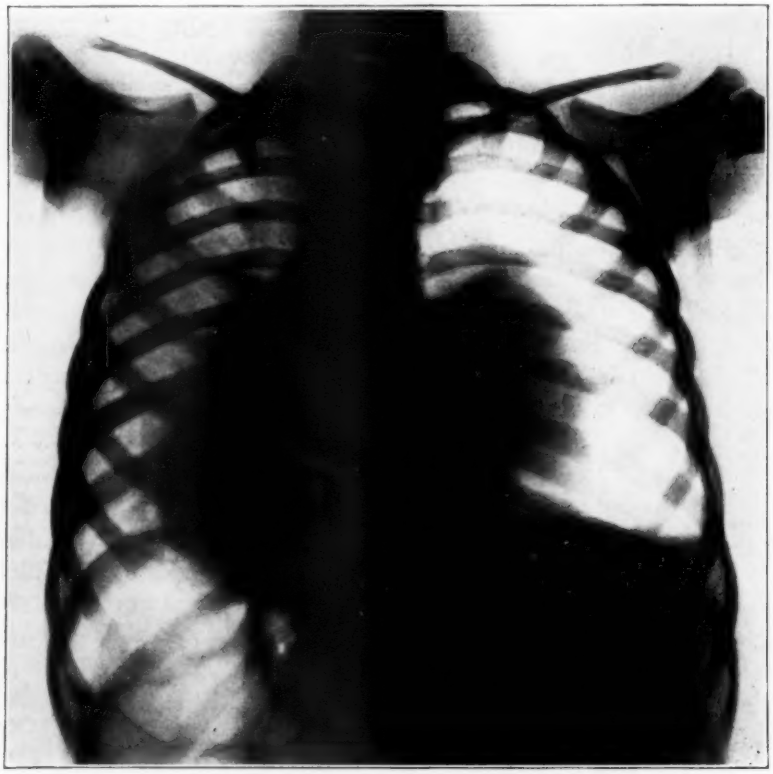

Fig. 1.—Right sided pyopneumothorax showing collapsed lung and costo-diaphragmatic angle obliterated. The heart is displaced to the left.

air only was obtained with the needle, and yet at operation the same day 2 or 3 ounces (59.2 or 89 cc.) of pus was evacuated. The roentgenogram taken the same day showed only the costal-diaphragmatic angle obliterated with the level of the fluid about 1 inch above the diaphragm.

Syphon drainage was done in four children. Two died shortly after operation. The other two survived, but later a resection of the ribs was necessary. Three infants died before any operation was attempted. Resection of the ribs or open incision between the ribs with drainage

tubes inserted was done in the other three. There is no doubt that respiration is made easier if the opening is free. After operation, the mediastinum in these patients was found to be nearer the normal position, indicating that the pressure on the two sides became more equalized.

Every effort should be made to encourage the expansion of the lung. Forced crying for the infants and blowing exercises for the older children will aid. Infectious diseases, particularly the respiratory diseases, must be avoided. It seems too self-evident to mention the importance

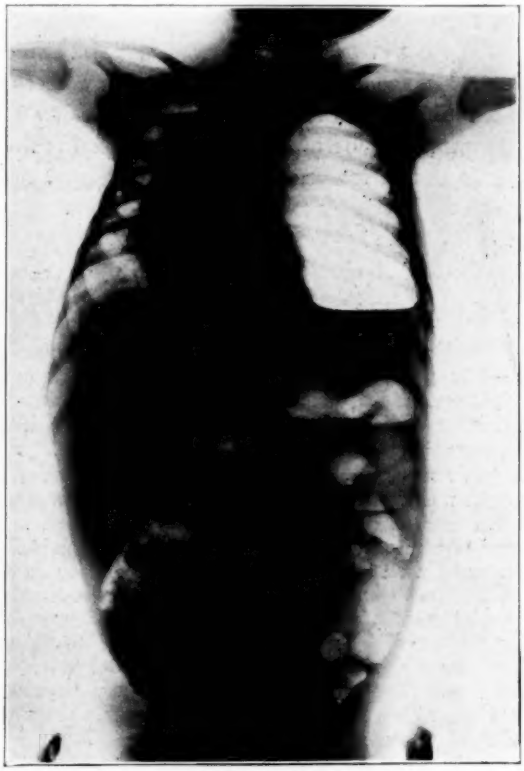

Fig. 2.—Left sided pyopneumothorax showing collapsed lung and fluid line. The heart is pushed to the right.

of the care of the nutrition, but in young infants, this is, in all infections, one of the important factors in determining the outcome. Transfusions are of great help to these infants and in the future will probably save more of them.

Necropsy was performed on three of the patients, and the details are appended to the case reports. All three were practically identical, showing rupture of the lung in the upper lobe, a thick pleural exudate with interlobar adhesions, collapsed lung with one or more pulmonary

abscesses, and more or less chronic bronchopneumonia. Two of the cases also showed recent pleural adhesions between the visceral pleura and the pericardium, diaphragm and parietal pleura. In two cases, only a single abscess was present, but in the other case there were several small pulmonary abscesses. It is striking that the upper lobe was the site of the rupture in all three.

It is difficult to state positively why the rupture in the visceral pleura occurs. Huber and Hirsch [1] and others state that it is due to the tearing of the visceral pleura and the lung by pleural adhesions. This is not substantiated by the observations at necropsy. The adhesions were not firm enough. They could easily be severed without affecting the substance of the lung. In the three infants who came to necropsy, abscesses were found at the site of the rupture. These probably ruptured from the excessive accumulation of pus. This also explains the rapid development of fluid in the pleural cavity.

REPORT OF CASES

CASE 1.—*History.*—B. R., a white girl, aged 26 months, was admitted to the hospital, May 12, 1924. The present illness began two weeks before admission with high temperature and delirium. There had been much coughing with sustained temperature. Cyanosis had developed gradually.

Examination.—The patient was well developed and well nourished; she was cyanotic; the weight was 12,200 Gm. She was listless and appeared sick, breathing with difficulty. Cardiac dulness extended well outside of the left nipple line, with the point of maximum impulse in the sixth interspace, 2 cm. outside of the left nipple line. The heart sounds were fairly well heard, without any murmurs. The left side of the chest was normal. On the right side the expansion was decreased. The percussion note was dull over the lower part of the back and in the axilla, but over the upper lobe there was tympany. The breath sounds, not well heard, were amphoric in quality all over the right side. Succussion and the coin sound were easily elicited. The liver edge was felt 3 cm. below the costal margin. Blood examination showed 16,600 leukocytes with 65 per cent polymorphonuclears. The Pirquet test was negative. The condition was so bad that immediate syphon drainage was done through an intercostal space. Air and a large amount of pus escaped. Culture grew *Staphylococcus aureus.* Twelve days later a resection of the ribs was performed for better drainage. On June 2, the tubes were removed. By June 15, the child was well, except for a slight discharge from the wound; the roentgenogram showed a thickened pleura with good expansion of the lungs. The patient was discharged on June 23, five and one-half weeks after admission.

CASE 2.—*History.*—J. D., a white boy, aged 4 weeks, was admitted to the hospital, Nov. 10, 1924. The only available history was that he had been sick for at least four days with fever, cough and nasal discharge. On admission, he was not acutely sick; the temperature was 99; weight, 2,740 Gm., and he was breathing quietly and without pain. The only positive observations were râles at the right base suggesting bronchopneumonia. Two days later definite dulness, suppressed breathing with amphoric quality and râles were heard over the right lower lobe, making a diagnosis of pneumonia more certain. Two days later the same signs were found all over the right side anteriorly as well as posteriorly. Although tympany, coin sound or succussion were not elicited, the diagnosis of pyopneumothorax was suggested. The next day the signs were less marked, and the diagnosis of bronchopneumonia seemed most probable. The Pirquet test was negative. One week after admission the child died.

Necropsy (Dr. Martha Wollstein).—The body was immersed and the chest opened under water. Large air bubbles came from the lower half of the right pleural cavity; none came from the left. An exudate of fibrinopus was found on the right half of the posterior sternal surface, sharply limited just to the left of the median line. There were adhesions between the sternum and the right lung and pericardium. The right pleural cavity contained about 10 or 15 cc. of fluid pus. The right lower and middle lobes were both retracted from the chest wall, leaving a cavity extending to the lower border of the third rib. This cavity contained air and a small amount of pus. Above it, the right upper lobe showed a depressed area, 1 by 1.5 cm. in diameter, covered with thickened pleura. This crater-like area showed two irregular tears on its floor, through which air could be expressed. About 5 cc. of pus was held over the upper lobe above the necrotic area and was released when adhesions about the necrotic area were torn. The middle and lower lobes were small and almost airless. The upper lobe showed bronchopneumonia, the necrotic area described in the foregoing and several intercommunicating abscesses filled with thick pus, the largest being 0.5 cm. in diameter and 0.5 cm. in depth. The left lung showed a slightly dull pleura over its lower lobe, with acute bronchopneumonia and areas of peribronchial purulent infiltration. One small abscess had formed. The upper lobe was aerated and emphysematous anteriorly. Thus, the process in both lungs was essentially the same, but in the right side it had progressed further.

The anatomic diagnosis was: pyopneumothorax, *Staphylococcus aureus;* bronchopneumonia; abscesses of the lung; pulmonary emphysema; external pericarditis and acute splenitis.

Case 3.—F. J. R., a white boy, aged 2½ months, was admitted to the hospital, Jan. 17, 1925. One week before admission there were three days in which the baby vomited forcibly nearly every time he ate. Bronchitis developed three days before admission.

On January 18, examination showed a feeble infant with marked pallor and rapid respiration. The right side of the chest was normal, but all over the left side there was dulness and diminished breath sounds, without change in quality. Fremitus was present without a coin sound or succussion. The heart was in the normal position, but the sounds were feeble. The spleen was palpable, and the liver was felt 3 cm. below the costal margin. The following diagnoses were suggested: congenital atelectases, pyopneumothorax, diaphragmatic hernia, empyema and bronchopneumonia. The next day a roentgenogram showed "a complete left pneumothorax with mediastinum pushed to the right." The costal-diaphragmatic angle was obliterated, and a fluid line was observed a few centimeters above the diaphragm. The child died shortly after the roentgenogram was taken and before any operation was attempted. The Pirquet test was negative. The blood showed 30,400 leukocytes, with 58 per cent polymorphonuclears. A necropsy was not obtained.

Case 4.—*History.*—J. T., a white boy, aged 3 years, was admitted to the hospital, March 22, 1925. The present illness dated from eight days before admission when he was taken sick with tonsillitis, which subsided, but four days later he became much worse with high fever, cough and listlessness. Examination revealed a definite pneumonia of the right upper lobe. There were dullness and loud bronchial breathing over the involved area. The heart sounds were weak and were heard with difficulty; the spleen was just palpable, and the temperature was 105 on admission. A roentgenogram taken on the 24th showed "consolidation of right upper lobe with thickened pleura on the periphery of the right lower lobe with a small amount of consolidation here." The signs of the presence of fluid on the right side began on the 26th, i. e., a marked dulness over the entire posterior section of the chest was present, extending up into the axilla. This was confirmed by the roentgen ray on the 28th. On the 31st, the child became much worse and amphoric breathing and a hyperresonant note over the upper lobe, in which marked dullness was noted the day before, were heard on the right side. A coin sound but no succussion was present. A needle was inserted and at first a large amount of

air escaped but not any pus. The roentgenogram confirmed the diagnosis of pyopneumothorax, showing a collapsed lung and also some fluid. A syphon drainage operation was done and on incision, air escaped under great pressure with 3 ounces of pus. The heart sounds continued to be feeble, and pericarditis with effusion was suspected on the 25th. The child died on April 5 from sepsis, two weeks after admission. On March 23, examination of the blood showed: 6,800 leukocytes with 77 per cent polymorphonuclears and on April 2, 8,850 leukocytes with 70 per cent polymorphonuclears. The Pirquet test was negative. A culture made from the pleural pus showed pneumococcus type 3.

Necropsy (Dr. Martha Wollstein).—The right lung was pressed downward, away from the dome of the right pleura toward the vertebral column. It was covered on all surfaces by a thick layer of fibrinopurulent exudate, and there were only a few centimeters of fluid pus. The upper lobe was solid, with red hepatization and areas of purulent infiltration reaching the pleural surface. On the lower surface of the right upper lobe, there was an irregular tear, the size of a pin point at the apex of a small abscess. This upper lobe was a reddish brown, due to the hemorrhagic character of the exudate. The middle and lower lobes were small and flabby and contained practically no air. The left lung was of normal size, and two thirds of its area was covered by fibrinopurulent exudate. About 50 cc. of fluid pus was in the left pleural cavity. Anteriorly, the lung was emphysematous. Both right and left pleurae were adherent to the outer surface of the pericardium, which made a much enlarged sac, 9 cm. across the base, 11 cm. in length, and 6 cm. across the apex, filled with fluid pus. Fibrinopus was present over both visceral and parietal pericardium. All the mediastinal tissues were matted together with purulent exudate.

The anatomic diagnosis was: suppurative pleurisy, double (pneumococcus, type 3); suppurative pericarditis; suppurative mediastinitis; lobar pneumonia; pulmonary abscesses; pulmonary carnification; pulmonary emphysema; fatty liver; acute splenic tumor; acute fibrinous perisplenitis; parenchymatous degeneration of the kidneys.

CASE 5.—*History.*—D. L., a white girl, aged 4 weeks, was admitted to the hospital, April 12, 1924. Four days previously she had begun to lose appetite, breathe rapidly and cough. For twenty-four hours she vomited everything.

Examination.—The color was cyanotic, and breathing was rapid with expiratory grunt. The left side of the chest was hyperresonant but not tympanic. Breath sounds were not heard over the entire left side, but at the end of inspiration a clinking noise was heard. The coin sound was definite, but succussion was not present. The heart dulness was almost entirely to the right of the left sternal border. A systolic murmur was heard at the right of the sternum, and the heart sounds were heard only over the area to the right of the left sternal border. The point of maximum impulse was in the fifth interspace, 0.5 cm. inside the nipple line. On the right side there were dulness and bronchial breathing in the axilla and at the apex in front. The roentgenologist reported "left lung collapsed with air and liquid in left pleural cavity. The heart and mediastium are moved to the right side. The right upper lobe is hazy suggesting consolidation or thickened pleura." The next day a needle was inserted into the left side of the chest and 40 cc. of air withdrawn under pressure. An incision was made for syphon drainage and air and pus obtained. The culture from the pus showed pneumococcus type 4. The child became worse and died several hours after operation. Necropsy was refused.

CASE 6.—*History.*—J. B., a white boy, aged 2 years, was admitted to the hospital, Nov. 10, 1914. He had had measles and several attacks of otitis media. One week before admission he began to cough, but did not appear sick until two days later when fever and rapid breathing ensued.

Examination.—Rapid respiration and the appearance of pneumonia were evident. The left lower lobe was partially consolidated, with signs of dulness, bronchial breathing and a few râles. The rest of the chest was normal. The heart seemed

normal. On November 18, the bronchial breathing, dulness and râles extended anteriorly. On the 23, the left side of the chest was almost clear, and the child seemed well with only a slight temperature. Otitis media developed, and the drums were incised. On November 28, the temperature was normal. On December 3, the temperature rose to 102, and the following signs were found: The intercostal spaces on the left side were obliterated. The left side of the chest was fuller than the right and there was no excursion with inspiration. Hyperresonance over this side was present but no tympany; the breath sounds were much diminished all over this side and were amphoric in quality, with metallic tinkle and succussion. The spleen, which had not been felt previously, was now 5 cm. below the costal margin. The heart was displaced to the right, with the point of maximum intensity just to the right of the sternum in the fifth interspace. Ten cubic centimeters of turbid amber fluid was removed with a needle. On December 8, 5 cc. of fluid was removed. The signs were the same, except that no succussion was heard. On December 20, the signs were the same, except that the note over the upper left side was tympanic. On January 4, on exploration of the left side of the chest, pus was obtained, and syphon drainage evacuated 8 ounces (236 cc.) of pus. January 5, the child was breathing better, and the heart was in nearly normal position. He then developed enterocolitis and died on January 16, 1915. The chest signs had improved. The Pirquet test was negative. On November 16, the blood count showed 28,000 leukocytes, with 75 per cent polyphorphonuclears. Culture made from the pus in the chest showed pneumococcus.

Necropsy (Dr. Martha Wollstein).—The right lung did not show any pleurisy and was well aerated. The left pleural cavity did not contain any fluid. The lung collapsed against the spinal column and was half as large as the right. A fibrinous band divided the pleural cavity into two unequal parts. The band was 3 cm. wide at its parietal attachment to the third, fourth and fifth ribs, and 4 cm. long. From the anterior lower angle of the lung a shorter band ran to the pericardium. The pleura was thickened with an exudate of fibrinopus. In the posterior portion of the lung, both lobes were equally solid. In the anterior part of the upper lobe was a fluctuating abscess 2 by 2 cm. with an opening, 3 mm. in diameter, in its wall. Between the base of the lung and the diaphragm was the cavity that had been drained, a notch in the lung indicating the position of the drainage tube.

The anatomic diagnosis was: fibrinopurulent pleurisy; bronchopneumonia; pulmonary abscess, and rupture of the lung.

Case 7.—*History.*—L. M., a white girl, aged 17 months, was admitted to the hospital, Dec. 29, 1911. She had bronchopneumonia and diphtheria one month before in this hospital, and was discharged on account of the diphtheria. The cough had continued, but three days before the second admission, high fever and dyspnea had set in suddenly. She had been refusing food and had not slept on account of the dyspnea.

Examination.—The child was acutely ill, breathing 60 times a minute with expiratory grunt and dilatation of the alae nasi. The left side of the chest was hyperresonant, almost tympanic, with dulness in the scapular region which varied with change of different positions. The breath sounds were hardly audible over the entire left side. The heart sounds were heard best in the midline, and cardiac dulness to the left could not be made out. Dulness to the right was indefinite. The spleen was easily felt 3 cm. below the costal margin. When a needle was inserted posteriorly, a cavity was entered and the piston of the syringe was blown out. The dyspnea was not relieved. The next day emphysema developed around the needle wound and extended anteriorly. A roentgenogram on the 31st showed pneumothorax with collapsed lung and heart slightly pushed to the right. By January 4, the emphysema had disappeared and the breath sounds were better heard, but still feeble. The temperature remained elevated. On January 6, the child seemed better; the breath sounds were clearer. The heart sounds were rapid and fetal in character. On January 8, over the upper lobe

the note had become dull while at the base there was hyperresonance. A needle was inserted and 5 cc. of bloody pus evacuated. Pneumococci were found on culture. On January 10, with flatness over the upper lobe, a needle was again inserted and 1 cc. of bloody fluid was obtained. For several days a systolic murmur had been heard at the apex of the heart. On January 17, the signs in the left side of the chest continued to suggest fluid, but no succussion was found. A needle was again inserted, but only 1 cc. of bloody pus was obtained. On January 21, the signs were the same, but the child was losing weight and looked much worse. On January 23, the same signs were noted, except at the base the note was more like that over the upper lobe. On January 24, needle puncture was done and considerable foul smelling, thick greenish pus obtained which showed streptococci and proteus bacilli. Incision was made, and tubes were inserted. On January 28, a great deal of drainage was found on the dressings, and the edges of the wound were necrotic. On January 30, the child died. Necropsy was not permitted. The Pirquet test was done twice and found negative. Leukocytes in several counts ranged from 26,000 to 44,000, with polymorphonuclears varying from 60 per cent to 82.5 per cent.

Case 8.—*History.*—R. F., a white girl, aged 17 months, was admitted to the hospital, Aug. 9, 1922. About a week before, she developed a "cold in head and chest" which two days later became worse. The temperature rose to 100 or 104 and shortness of breath began.

Examination.—The child was acutely ill, breathing rapidly, with expiratory grunt and dilatation of alae nasi. There was consolidation at both apexes, with bronchial breathing and dulness. The liver and spleen were not palpable. On August 11, the breath sounds were markedly diminished over the entire right side and nearly inaudible at the base. There were no râles. Dulness was present and tactile fremitus was absent. Metallic tinkling was present, but no succussion. The heart was displaced, and dyspnea and cyanosis were increasing steadily. The roentgen ray confirmed the diagnosis of pneumothorax, with lung moderately collapsed. Fluid was not present in the pleural cavity, and the heart was probably slightly displaced. The blood showed 44,000 leukocytes, with 90 per cent polymorphonuclears. On August 13, the signs were the same except that the note on the right side anteriorly was more resonant than on the left side. The breathing had a cavernous quality, with a definite coin sound in the axilla and over the upper lobe anteriorly. Succussion was not elicited. The heart was displaced to the left and the point of maximum impulse was in the sixth interspace, inside of the nipple line. The spleen was felt 2 cm. below the costal margin, and the liver was 5.5 cm. below the costal margin. On August 14, succussion was elicited. On August 15, syphon drainage was done after air and pus were evacuated by the needle. *Staphylococcus aureus* was found in the pleural pus. On August 26, section of the ribs was done to increase drainage. On September 8, the child was discharged much improved. The roentgenogram showed that the lung was expanding and the heart nearly in the normal position. There was still slight discharge from the wound. The Pirquet test was negative. The temperature was 105 on admission and became normal on August 19.

Case 9.—*History.*—A. W., a white girl, aged 8 months, was admitted to the hospital, Sept. 1, 1922. Two days before admission she was seen in the outpatient department with bronchitis and a temperature. The next day she became much worse and seemed to cry with pain.

Examination.—The appearance was that of pneumonia with expiratory grunt and rapid respiration. Otitis media was found; the left side of the chest was clear. On the right side there was dulness throughout posteriorly, with bronchial breathing at the apex posteriorly and in the lower lobe near the spine. The râles in these two areas were fine, subcrepitant in character. The heart was normal; the liver was just palpable and the spleen was not felt. The blood count showed 25,000 leukocytes, with 69 per cent polymorphonuclears. The Pirquet test was negative. On September 2, dulness over the right side posteriorly was greater with

nearly flatness at the base. Bronchial breathing was found over a greater area. The râles were more numerous. On September 4, the child was very sick and dyspneic. There was flatness over the right base and the breathing was broncho-vesicular. On September 5, she became cyanotic. The lower lobe seemed clearer and less dull. Râles were now heard over the middle lobe. On September 6, a small area of amphoric breathing was noted just outside of the right nipple line and less dulness over the right base. The liver was now 5.5 cm. below the costal margin. On September 7, the child was quite exhausted. Resonance over the right side of the chest and amphoric breathing had extended over a large part of the right side. The râles had a metallic tinkle, a coin sound was present, but no succussion. The chest was needled and 4 cc. of "café au lait" colored fluid was obtained with air. Culture showed *Staphylococcus aureus*. On account of the critical condition of the infant, an operation was not done but aspiration drew off a large quantity of air and 25 cc. of pus; the child died soon afterward. A necropsy was not obtained.

Case 10.—*History.*—I. L., a white girl, aged 6 months, was admitted, Dec. 30, 1922, with dyspnea. The present illness began with a cold in the head two weeks before admission, but she was not actually sick until three days before entrance, when a temperature of 103 was recorded and she had begun to cough. For eight hours before admission there had been difficulty in breathing.

Examination.—The child did not look prostrated, but the breathing was rapid, accompanied by a dry cough. The right apex was dull posteriorly, and breathing was more bronchial over this area and fine râles were heard. Many coarse râles were heard all over both lungs. The heart was normal. The spleen was not felt, but the liver was down four fingerbreadths. On January 1, a definite area of bronchial breathing with fine râles at the right apex was mapped out. On January 2, there were signs anteriorly at the right apex as well as in the back. Numerous petechial lesions were seen over the chest. On January 4, the middle lobe had signs similar to the upper lobe. On January 5, the process had progressed to include the whole right side. The blood count showed 23,000 leukocytes with 45 per cent polymorphonuclears. The Pirquet test was negative. A culture of the blood grew pneumococci type 4. From January 8 to 10, dulness became greater and breath sounds more diminished but bronchial. On January 11, cyanosis and mottling of the skin were observed. The note over the right side of the chest had become tympanic except at the apex. Coin sound was not present. There was an amphoric quality to the breathing over the upper half. The heart was not displaced; the spleen was felt 1 cm. below the costal margin. On January 12, the child became cyanotic with coughing. On January 13, succussion was made out and coin sound was present. A needle was inserted, and air and 10 cc. of thick greenish pus were obtained. Culture showed pneumococci type 4. The roentgen ray showed liquid in the right side, displacing the heart and trachea to the left. The lung was compressed or collapsed. On January 14, the chest was incised and after a large piece of fibrin was removed a large amount of pus spurted out. Tubes were inserted. On January 20, the child had not improved. Both ears were incised. On January 25, tranfusion of 140 cc. of blood was given. On February 3, the roentgen ray showed a small sized pneumothorax of the right side of the chest with lines of pleural adhesions, well marked and without definite evidence of sacculated or free liquid. The progress had been satisfactory until February 20. The wound healed. Temperature rose on this date to 101 and 102 after a normal period since January 31. The breathing was suppressed over the right side but was vesicular. There was marked cyanosis when the child lay on the left side. Coin sound was obtained on the right side. A needle was inserted through the old scar and the plunger was blown out. Syphon drainage was instituted. Bubbles of air and some pus drained out. On March 2, she was much better without any cyanosis or dyspnea. On March 7, the roentgen ray showed the right apex partially collapsed, and the picture suggested thickened pleura with a small amount of fluid. On March 21, 1923, she was discharged as cured. When seen in July, 1924, she was entirely well.

SUMMARY

1. Pyopneumothorax may complicate pneumonia in infants, coming on spontaneously and insidiously and recognized only by careful routine physical examinations. It is probably not as rare a condition as the literature would indicate, but is not recognized in many cases.

2. The cardinal signs, tympany, coin sound and succussion, were present in approximately one half of the cases. The coin and succussion tests usually were first elicited on the third day after the onset of the pyopneumothorax.

3. Diminished breath sounds or their absence over an entire lung, with limitation of expansion on the same side, are the most suggestive physical signs.

4. The amount of fluid in pyopneumothorax in infants is nearly always much more than anticipated.

5. Roentgenograms taken with the patient in an upright position always show the presence of air.

6. All the ten patients probably had pleuropneumonia from the onset, and the pyopneumothorax was caused by a ruptured subpleural abscess.

7. The similarity of the conditions found in the three necropsies is striking. All three cases showed rupture of the lung in the upper lobe, a thick pleural exudate with interlobar adhesions, collapsed lung with one or more abscesses and bronchopneumonia.

8. Resection of the ribs is the operation of choice, even though there are no signs of fluid.

10. These are the youngest infants reported with pyopneumothorax complicating pneumonia, two being 1 month old.

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KERATODERMIA PALMARIS ET PLANTARIS CONGENITALIS

REPORT OF A CASE SHOWING ASSOCIATED LESIONS OF UNUSUAL LOCATION *

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This rare condition of the hands and feet, although in the past studied chiefly by dermatologists, should interest pediatricians as well, on account of its hereditary nature and its tendency to appear in early life. Then, too, it must be considered in differential diagnosis with a number of cutaneous disorders of childhood.

First described by Krost,[1] in 1880, and by Unna,[1] in 1883, the hereditary character of this form of keratodermia was emphasized by the earliest authors. Vörner recorded its existence in four generations of one family, sixteen out of forty members being affected. Cases have been reported from time to time in Europe, North and South America and Japan. The high incidence of the disease among the natives of the small island of Meleda in the Adriatic Sea off the coast of Dalmatia led early observers in this locality to attach to it the name of mal de Meleda and to consider it a peculiar form of leprosy. It was not until 1898, when the Viennese dermatologist Neumann visited the island, that the clinical identity of these cases with keratodermia was established. Crocker [2] ascribed the apparently endemic character of the disease in Meleda to the result of frequent intermarriage in an isolated island community.

Although hereditary keratodermia of the hands and feet may be transmitted directly, the German authors, according to Ludy,[3] consider the fact that it often skips several generations to be taken as a sign of atavism. Both sexes are affected, but the condition has been known to descend in the male or female line.

From the descriptions given by several authors, it is evident that keratodermia is not congenital in the strict sense of the word. The typical lesions are rarely present at birth but usually develop at some time within the first year or occasionally even later in childhood. A

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* From the Service of Dr. Joseph Brennemann and Dr. E. A. Oliver, Children's Memorial Hospital, Chicago.

1. In Ormsby, O. S.: Diseases of the Skin, ed. 2, Philadelphia, Lea and Febiger, 1921, p. 451.

2. Crocker, H. R.: Diseases of the Skin, ed. 3, Philadelphia, P. Blakiston's Son and Co., 1903, p. 587.

3. Ludy, J. B.: Keratosis Palmaris et Plantaris, Arch. Dermat. and Syph. 6:237 (Aug.) 1922.

skilled observer may, according to Hyde,[4] detect in the new-born infant the earliest manifestations of the disease. Hyperhidrosis and a diffuse violaceous redness of the palms and soles are mentioned by authors as the first symptoms to appear. A hyperkeratosis of the palmar and plantar epidermis soon follows and may reach such a degree of unsightliness as to render the unfortunate victim a social outcast. The horny plaques, on account of their thickness and the pain incident to tearing and fissuring, seriously interfere with and in severe cases even prohibit use of the hands and feet. Once established, the condition persists throughout life, with a tendency in many cases to partial remissions, particularly in warm weather. Although some improvement has been reported to have followed certain therapeutic measures, authors are practically unanimous in maintaining that the hereditary congenital form is incurable.

The following case, studied in the hospital during a period of nine months, presented a clinical picture corresponding in all essentials to the classic descriptions of hereditary congenital keratodermia of the hands and feet.

REPORT OF CASE

History.—Sam G., Italian, aged 5 years, was brought to the hospital, Oct. 2, 1924, by his father, who stated through an interpreter that no abnormalities of the skin had been noted at birth. At the age of 6 months a crust formed on the scalp, but this disappeared shortly afterward. During the second half-year of life, the present disorder of the hands and feet began. In 1922, a single visit to the hospital outpatient department was made. The hospital record of this visit, when the patient was 2½ years of age, described dry crusting lesions of the palms and soles with crusting and deformity of the finger nails; crusting yellow papules on the scalp; a few scattered dry crusts near the umbilicus and on the legs. A dry excoriated place near the right eye and a small crusted ulcer at the left angle of the mouth likewise were recorded. Nutrition and dentition at that time were considered normal. The child was not brought back to the hospital until the present date of admission. Meanwhile, the condition of the palms and soles had persisted. The date of onset of the other lesions was unknown. The boy first sat up at the age of 14 months and did not walk or talk until 2 years old. He had always been constipated.

History and Examination of Family.—An account of previous cutaneous disorders in the family or its progenitors could not be obtained. None of the members had ever lived in the vicinity of the island of Meleda. The mother had not had any miscarriages; one child had died in early infancy. I examined the parents and a brother and sister of the patient and found them healthy and free from cutaneous lesions. Negative Wassermann tests were obtained from both parents.

General Appearance of Patient.—The boy was undersize for his age, poorly developed and undernourished. He appeared constantly unhappy, at times miserable, and was always silent except for spells of low whining or crying, particularly when disturbed. Speech was limited to a few monosyllabic answers to direct questions. He moved in a slow deliberate manner and frequently rubbed his hands together. The appetite was generally poor.

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4. Hyde, J. N.: A Practical Treatise on Diseases of the Skin, ed. 8, Philadelphia, Lea and Febiger, 1909, p. 461.

Cutaneous Lesions.—The palmar lesions (fig. 1) were the most marked and were symmetrical. They consisted of thickening (from 0.5 to 1.5 cm.) of the epidermis with formation of massive yellow-gray horny plaques. This altered palmar epidermis did not exist as a single sheet but was divided by several deep fissures into blocks, making a mosaic pattern to the lesion. In places the edges of these plaques were upturned, revealing underneath a red granular surface. The lesions ended abruptly at the wrists and on the sides of the hands in a narrow (from 0.3 to 0.7 cm.) red marginal zone or border. The dorsal surfaces of the hands were unaffected. On the palmar surfaces of the fingers and thumbs were plaques that were divided at the interphalangeal joints by transverse fissures. A flexion deformity existed in all of the digits, interfering greatly with movement of the fingers. There was symmetrical enlargement of all of the phalanges but particularly of the middle and terminal ones. The plaques ended on the lateral surfaces of the fingers in an erythematous zone similar to that seen on the palms. The nonhyperkeratotic skin of the dorsal surfaces of the fingers had a purple-pink, almost cyanotic appearance, and frequently was studded with minute droplets of perspiration. In addition, a pronounced subungual and circumungual hyperkeratosis existed. The finger nails were curved laterally and anteroposteriorly, forming a sort of cap to each digit. The nail substance was thickened and lusterless and was marked by transverse ridges.

Fig. 1.—Palmar lesions of keratodermia palmaris et plantaris congenitalis.

Fig. 2.—Plantar lesions.

The plantar lesions (fig. 2) closely resembled those of the palms, except that they were not as marked in degree as the latter. The plaques on the left sole

were thinner and more flake-like than those on the right; the plantar epidermis over the head of the first metatarsal bone was nearly normal. A narrow zone of erythema bounded the plaques on the lateral surfaces of the feet. In places the edges of the plaques were upturned. The lesions ended abruptly on the plantar surfaces of the proximal phalanges, the distal being spared. The toes were not enlarged and were purple-pink like the fingers, but the changes in the toe nails appeared to be identical with those in the finger nails.

Hyperhidrosis of the hands and feet varied. At times the palmar plates were sodden and malodorous. The plaques of the feet generally were dry. The members usually were cold to the touch.

The facial lesion (fig. 3) consisted of a row of yellow-brown plaques of epidermis, interrupted by fissures, and situated parallel to the mucocutaneous junction of the lower lip and the angles of the mouth.

The anal fissure was filled completely in its middle half by opposing plaques of rough red-brown epidermis. When the buttocks were spread apart, a cone-shaped crater came into view. Its surface was red, moist and granular. The external anal sphincter formed the bottom of this crater. A biopsy was performed on the lesion. Subsequent proctoscopic examination did not reveal any apparent abnormalities in the anal canal and rectum.

Fig. 3.—Facial lesions.

The remainder of the skin appeared normal.[5] The hair was dry and the scalp healthy. Generalized hyperhidrosis was never observed. The teeth were fairly well developed. Shot-like lymph nodes could be palpated in the cervical, axillary, epitrochlear and inguinal regions. The patient had a chronic suppurative dacryocystitis of the right eye. The nose, throat and sinuses were normal. The abdominal wall protruded moderately. Tendon reflexes were unaltered.

Laboratory Examination.—A blood count on entrance showed 3,850,000 red blood cells (later this increased to normal). The white blood cells varied from 14,000 to 21,000 during the stay in the hospital. Differential examination and count did not disclose any abnormalities in red or white cells.

Wassermann tests on the blood repeatedly were negative. The spinal fluid did not show any increase in globulin or cell content and gave a negative Wassermann reaction. A negative intracutaneous luetin test was obtained. The gonococcus complement fixation test (by Dr. Russell Herrold) was negative. Tuberculin tests were negative by both the Pirquet and the Moro inunction method. The urine was normal as were the nitrogen fractions of the blood.

Bacteriologic Examination.—Gonococci, *Oïdium albicans* and mycelial structures were not observed in smears and cultures of the lesions of the hands, feet and anal region. Cultures from the palmar and plantar lesions produced *B. proteus.*

5. Since writing this paper I have been informed that a chronic lesion similar to that about the mouth appeared about the umbilicus during the latter part of the patient's stay in the hospital.

Biopsy.—Histologic examination of the tissue removed from the anal lesion showed a simple hyperkeratosis.

Subsequent Course and Treatment in Hospital.—Empiric treatments of various kinds were employed in an effort to remove the plaques. An ointment containing ammoniated mercury and tincture of benzoin produced no effect. Inunctions of mercury were used as a therapeutic test for syphilis without any visible result. Ultraviolet radiation and roentgen-ray exposures after fair trial were abandoned as useless. The only therapeutic success obtained followed repeated prolonged soaking of the parts in warm water followed by mechanical removal of the thickened epidermis. As a result of this treatment, the lesion of the lower lip disappeared and much of the thickened skin of the palms and soles was removed, leaving an underlying pink tissue, which on the soles was firm and smooth. For a few days the patient could walk with comfort, but painful bleeding fissures soon developed and prevented this. When the treatment was abandoned, each lesion returned to its original condition within the period of a few weeks.

During the third month of observation, the dorsal surfaces of the fingers became dotted with numerous small red papules. These were from 2 to 3 mm. in diameter and slightly elevated. They disappeared at the end of a few weeks. The fingers and thumbs became more enlarged. Subsequently, some of the transverse fissures of the palmar epidermis at the interphalangeal joints became deeper. This led finally to spontaneous amputation of two of the terminal phalanges. During his stay in the hospital the boy became happier, especially during the period when he was able to walk. He would occasionally speak a few words or short sentences. His appetite remained poor, and the nutritional state was unchanged. Late in 1925, he was taken home against advice.

COMMENT

The principal manifestations in this case were characteristic of keratodermia palmaris et plantaris of the hereditary congenital type. The fact that a history of its occurrence could not be obtained in this child's progenitors did not exclude the case from the hereditary classification when the frequent tendency to atavism was taken into account. The lesions were absent at birth and developed in the second six months of life. This delayed appearance has been recorded in the majority of previous case reports.

The degree of hyperkeratosis and of changes in the nails was equal to any that has heretofore been described in the literature. Practically all authors mention the presence of the border zone of erythema, Crocker [2] alone maintaining that it is absent in the congenital form. Dubreuilh [6] believes that this red zone is due to bruising. Other authors do not attempt an explanation but merely assert that it is not an inflammatory process. I am of the opinion that the border zone is merely the marginal zone of purple to red dermis that underlies the epidermal plaques. This congested appearing dermis is probably pathologically equivalent to the initial "diffuse violaceous redness of the palms and soles" that is said by Dubreuilh [6] to be characteristic of the beginning stage of congenital keratodermia.

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6. In Besnier, Brocq, and Jacquet: La Pratique Dermatologique, Paris, Masson et Cie, vol. 2, p. 927.

Hyperhidrosis was variable in our case and was limited chiefly to the palms. Other authors mention its common occurrence, although Hyde [4] holds that it is rare in the congenital form. Enlargement and spontaneous amputation of the fingers are not mentioned in the available literature.

Associated hyperkeratotic lesions of the circumoral and circumanal regions have not been previously reported [7] to our knowledge. The Japanese investigators Sakurane and Toyoshima [8] describe a case in a boy of 16 in which the penis, genitocrural, and axillary regions were affected, but they are not certain that it should be classified with the congenital, symmetrical keratomas. Associated hyperkeratosis of the umbilical region, elbows, forearms, knees, and legs has been described. In photographs in some of the published cases the lesions appear to resemble icthyosis or eczema more than they do keratodermia.

PATHOLOGY

Thost, Vörner and Unna, according to Hartzell,[9] found great thickening of the horny layer and increase in the rete, the latter due to hyperplasia of the prickle cell layer. Marked elongation of the papillae also was found, and the coils of the sweat glands were hypertrophied. Besnier and Balzar [6] noted infiltration of the corneal bed with eleidin. Biopsy of the anal lesion of my patient demonstrated simple hyperkeratosis. Unna [10] regarded the pathologic changes as indicative of a "nevoid hypertrophy of the palms and soles." Neumann [11] considered keratodermia to be an hereditary anomaly of the skin. It is significant that Dubreuilh [6] and Mason [12] mention the occasional association of nevi with keratodermia.

DIFFERENTIAL DIAGNOSIS

The acquired form of keratodermia palmaris and plantaris, which the majority of authors consider to be more common than the congenital form, usually affects adults. Although hyperhidrosis and a marginal zone of erythema are practically constant features the degree of hyperkeratosis found in acquired keratodermia almost never approaches that

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7. Dr. M. G. Peterman, now of Milwaukee, on seeing this patient at the hospital, stated that while at the Mayo Clinic he had seen a case practically identical with this one and having both the circumanal and circumoral lesions.

8. Quoted by Matsumoto, S.: Congenital, Symmetrical Palmar and Plantar Keratoma, with Special Reference to the Atypical Forms, Urol. and Cutan. Rev. **22**:215 (April) 1918.

9. Hartzell, M. B.: Diseases of the Skin, ed. 1, Philadelphia, J. B. Lippincott Co., 1917, p. 482.

10. Quoted by Hartzell (footnote 9).

11. Quoted by Stelwagon and Gaskill: Diseases of the Skin, 1921, p. 547.

12. Mason, F. R.: Symmetrical Hereditary Keratodermia Palmaris and Plantaris, Arch. Pediat. **40**:541, 1923.

seen in the congenital form. Lesions in the circumoral and circumanal regions have not been reported. Recovery is rapid following the institution of appropriate treatment. In the variety due to arsenic the history and the presence of the characteristic corneal "horns" aid in differentiation.

To the pediatrician, icthyosis is the condition most apt to be confounded with congenital keratodermia. Dubreuilh [6] makes the assertion that "although keratodermia might be said to be a local icthyosis, in its hereditary transmission it never returns to the common type." The lesions of icthyosis generally are present at birth and are confined to the trunk and limbs. When the palms and soles are involved—and this is rare—the epidermis in these regions does not peel to any considerable degree.

In the patient described here it became necessary, on account of his appearance of abject misery, mental dulness, slow movements, and rubbing together of the hands, to rule out the clinical entity known as acrodynia. However, many of the other common general symptoms of this disease, such as rhinitis, generalized sweating, loss of teeth and hair, were absent. The principal American authorities on acrodynia, including Bilderback [13] who first described cases in the United States, do not mention hyperkeratosis in their descriptions of the cutaneous lesions of acrodynia. The hands and feet are swollen and blue or erythematous; this appearance has given rise to the term "raw beef hands and feet." The borders of the lesions are not sharply demarcated as in keratodermia. The cheeks, the nose, or even the entire skin may be involved. Desquamation accompanies the fading of the rash, and pigmentation often remains. Acrodynia is a self limited disease terminating generally in recovery at the end of a few weeks or months.

In eczema of the palms and soles, the lesions usually are poorly or only partially circumscribed. The borders of the lesions have a tendency to scale without the formation of plaques. The presence in the majority of cases of typical eczematous lesions elsewhere on the body aids in the differentiation from keratodermia.

The occurrence of palmar and plantar syphilid of hyperkeratotic type is not mentioned by Veeder and Jeans [14] in their monograph on hereditary syphilis. A late keratoma, which usually is unilateral, has been described in acquired syphilis.

Keratodermia blenorrhagica is a cutaneous complication of gonococcus infection. In the localized form the lesions appear a few weeks

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13. Bilderback, J. B.: A Group of Cases of Unknown Etiology and Diagnosis, Northwest Med. **19**:263 (Oct.) 1920. The patient described in this paper was seen by Dr. Bilderback, who also considered the case clearly not one of acrodynia.

14. Veeder, B. S., and Jeans, P. C.: Hereditary Syphilis, in Abt's Pediatrics, Philadelphia, W. B. Saunders Company, 1924, vol. 5, p. 611.

after the acute primary infection and simultaneously with the acute arthritic manifestations of the disease. The hyperkeratosis of the palms and soles is inclined to be nodular or conical, and waxy. The skin lesions disappear rapidly during the subsidence of the acute arthritis. A report of the occurrence of keratodermia blenorrhagica in children could not be found in a search of the available literature. In my patient smears from the lesions and from the rectum did not contain gonococci, and the gonococcus complement fixation test of the blood was negative.

The cutaneous lesions of leprosy, syringomyelia and dermatitis repens are not hyperkeratotic in type. In cutaneous thrush, the lesions are nodular and the disease attacks the dorsal as well as the ventral surfaces of the hands and feet. Other parts of the skin may become involved, or even the lungs, as in the case reported by Christison,[15] which had a rapidly fatal termination. *Oïdium albicans* is easily demonstrated in the cutaneous and other lesions.

SUMMARY

A case of keratodermia palmaris et plantaris of the congenital hereditary type is described. The previous occurrence of associated similar lesions in the circumoral and circumanal regions, such as existed in the patient described, has not been reported in the literature at my command. It is hoped that this case report, by calling the attention of pediatricians to keratodermia in infancy and childhood, will lead to earlier detection of the condition and to further pathologic study of the incipient stages.

1211-1216 Medical and Dental Building.

15. Christison, J. T.: A Fatal Case of Thrush Involving the Skin, Lungs and Nails, Am. J. Dis. Child. **26**:250 (Sept.) 1923.

NONOPERATIVE TREATMENT OF INTUSSUSCEPTION *

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The nonoperative treatment of intussusception has been frowned on by the American surgeon. American literature has condemned any attempt at reduction of an intussusception by injection of gas or enema on the ground of the dangers attending such an unscientific procedure. This point of view undoubtedly is correct. I believe, however, that if proper technic is used, this treatment will be found successful at times. Koch and Oerm have reported 400 Danish cases of intussusception in which treatment was by enema. They have made a statistical study of these cases, comparing them with those in which treatment was surgical. The figures presented give a lower mortality with the nonsurgical than with the surgical treatment. I believe that by observing improved technic and by selecting cases carefully the dangers of nonsurgical treatment can be practically eliminated.

The injection of gas into the bowel in the hope of relieving an intussusception is a dangerous procedure. First, it is difficult to control the pressure used. Secondly, the procedure is a blind one, and it is impossible to know what is occurring in the abdomen. This method is a relic of the presurgical age and should not be used.

Jacobi advised the injection of water with the buttocks elevated. This method is an improvement over the injection of gas since the pressure can be regulated, but here again the method is blind and is subject to the same dangers.

I have been successful in using a method of injection of barium under the fluoroscope, with manual pressure for the relief of intussusception. I believe that in properly selected cases this method can be used with comparative safety.

TECHNIC

The technic used is as follows:

The child is placed on a horizontal fluoroscopic table, and barium in water is injected into the rectum by gravity, under a pressure of about 4 feet. In case the obstruction is complete, the barium will stop at some level below the intussusception. The barium supply is turned off. There is then a column of barium in the colon and above this a column of gas. Above the gas is the obstruction. The inner side of one hand is placed transversely across the lower abdomen in order to apply pressure on the sigmoid. This is done to prevent the barium from escaping. Pressure then is carefully made on the colon with the palm of the other hand, forcing the barium upward. This advancing barium forces the gas in the

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colon upward, distending the colon and exerting an even pressure against the obstruction. The result of this procedure is watched in the fluoroscope.

If the obstruction is not relieved, the column of barium will be seen returning when the pressure is removed. The pressure exerted by the hands should be repeated several times while the operator is watching the effect through the fluoroscope. If the obstruction is relieved, the barium will tend to fill the colon quickly. The barium and water should then be turned on again to allow the colon to fill completely. This is an important step, as the greatest danger in this treatment comes from incomplete disinvagination. If the colon filled with the barium can be completely outlined by the roentgen ray, one can be sure that the intussusception is entirely relieved.

An attempt at reduction of an intussusception should not be made unless the patient is seen early in the attack. I think that it should not be done unless the patient is seen within twelve hours from the onset. Later, the intussusceptum may become bound to the intussuscipiens by edema and exudate. The wall of the intestine may become weakened and may then tear or perforate easily. This opinion may be incorrect, as it is not shared by Koch and Oerm,[1] who say:

> We make no restriction in this indication as regards the duration of the case, unless signs of peritonitis are at hand, as even cases of longer standing yield better results by the bloodless than by the operative method. In especially doubtful cases, primary operation is allowable within the first twelve hours but they will not prove more satisfactory than the bloodless treatment. After the twelfth hour an operation is extremely risky. Secondary operations ought not to be neglected when the bloodless treatment fails, as we may thereby save one fourth of the otherwise desperate cases.

It has been taught that as soon as a diagnosis of intussusception is made the child should be operated on immediately. The mortality increases with delay. I believe that an attempt first should be made to reduce the invagination by the method described above, and in the event that this is unsuccessful, immediate operation should be performed. This will only delay operation at the most for two hours, which will not affect the mortality. In fact, when one considers the number of patients saved from the danger of operation, one can feel sure of reducing the number of fatalities.

There are several important points to remember in using this method. First, it should be used only within the first twelve hours. Later, there is a possibility of rupture or tearing of the bowel from interference with its blood supply. Second, the pressure applied in the effort to disinvaginate the bowel should be made with the hand gently forcing the opaque substance up the colon and not by elevating the barium column. The effect of this manual pressure is observed and as easily varied as may be necessary. This minimizes the danger of rupturing the bowel. Third, the operator must be satisfied that the intussusception is entirely

1. Koch and Oerm: Edinburgh M. J., 1912, p. 238.

relieved. (Among the 400 cases reported by Koch and Oerm, the disinvagination was incomplete in fifteen. In five of these the condition was recognized and the patients were operated on. In the remaining ten the disinvagination was not recognized as incomplete.) Incomplete disinvagination can be determined in the following ways: In case the disinvagination is complete, the colon will fill completely. This can be seen in the fluoroscope but is more surely visualized by roentgenograms. If the colon is not outlined properly by the barium, safety demands an immediate laparotomy. In the event that the intussusception is relieved, the abdominal tumor will disappear. Further, the child must be relieved from symptoms. Further vomiting should not occur. If it does, prompt operation is indicated. The child should be relieved of evidence of shock, as is well shown by a changed mental attitude. The physician cannot feel safe if these warnings are not satisfied. He must remember also that intussusception may recur.

Intussusception of the ileum cannot be relieved by this method.

REPORT OF CASES

CASE 1.—W. F. H., a boy, aged 9 months, was seen Sept. 21, 1926, with the complaint of a nasopharyngitis and croupy cough since September 17. Castor oil had been given the day before examination.

The feedings had consisted of breast milk, cereal, potato and one other vegetable daily. The weight had been stationary (15 pounds [6,804 Gm.]) for two months. The infant had had a bowel movement once in every twenty-four to seventy-two hours.

The tissues were flabby; the fontanel was 2 inches wide, the parietal bosses were thickened, and definite rosary was present. There were no teeth. The chest, heart and abdomen were normal. The nose and throat were inflamed. The temperature was 98.6.

On September 22, the stools, passed four times daily, were loose, and continued to be loose until September 26, when the infant vomited the feeding given at 6 a. m. and continued to vomit at intervals during the morning. In the afternoon, vomiting was much less. The vomitus contained saliva and mucus. At 5 p. m. there was a bowel movement containing fecal material. The infant was examined in the afternoon. An abdominal tumor was not found. The temperature was normal, and except for a few fine râles heard in the bases of the chest, the observations were negative. The infant seemed better during the night but vomited again at 10 a. m. on September 27. There had been a mucous stoool at 4 a. m. The mother did not see any blood in this stool. The infant continued to vomit, and all vomitus contained bile. He seemed to be in pain at intervals. The mother reported that he acted as if he were in a stupor and slept except at intervals when he cried out as if in pain.

At examination, the extremities were cold. A few scattered fine bubbling râles were heard posteriorly in the lower part of the chest. The abdomen was relaxed. Evidence of tenderness or muscle spasm was not present. Above the navel in the midline could be felt a sausage-shaped tumor about 4 inches (10 cm.) long. The temperature was 98.6 and the pulse 140. A diagnosis of intussusception was made. The infant was placed on a horizontal fluoroscopic table, and barium was injected slowly by gravity into the bowel. It would only enter to the junction of the sigmoid and the descending colon (fig. 1). Manual pressure as described above then was applied to the abdomen, forcing the column of barium upward along

Fig. 1 (case 1).—Barium injected into the bowel which has entered only to the junction of the sigmoid and the descending colon. As figures 1, 2, 3, 4 and 5 appear here, the sides have been reversed, so that the right now appears on the right side of the picture and vice versa.

Fig. 2 (case 1).—Column of barium being forced upward by manual pressure applied to the abdomen.

the descending colon. Figure 2 shows this position. The procedure was repeated about six times when the resistance was suddenly relieved and the bowel partly filled with barium. A roentgenogram (fig. 3) was immediately taken and shows the intussusception partly disinvaginated. More barium was then injected and the colon completely filled, as shown in figure 4. Attempt was then made to palpate the tumor and it could no longer be felt.

Fig. 3 (case 1).—Partly invaginated intussusception after injection of barium was repeated six times.

Fig. 4 (case 1).—Completely filled colon after seventh injection of barium.

The attitude of the infant immediately changed from apathy to irritability. He seemed hungry and cross when disturbed. He was given diluted orange juice, containing some sugar, every half hour. Further vomiting did not occur. Recovery was complete.

CASE 2.—S. A. G., a girl, aged 9 months, was seen March 5, 1926. She had been breast fed. When 2 weeks old she had had attacks of breath holding with cyanosis which were promptly relieved by roentgen-ray treatment of the thymus

gland. This had not recurred. On March 4, she began to vomit at 5:30 p. m. and continued vomiting at intervals during the night. She passed a mucous stool containing blood during the night.

The infant was first seen at 4 p. m., March 5. She had vomited three times during the day a greenish fluid containing mucus. She had slept during the day but had awakened at intervals, crying as if in pain.

The infant appeared sick. The eyes were sunken; the fontanel was depressed. Examination of nose, throat, chest and heart was negative. The abdomen was relaxed. A mass was felt above and to the right of the navel. This mass seemed about 3 inches (7.6 cm.) long and about the thickness of a thumb. The temperature was 101 and the pulse 150. A diagnosis of intussusception was made. The abdomen was examined under the fluoroscope. Barium in water was injected into the colon and passed upward beyond the splenic flexure and across the transverse colon for a distance of about 3 inches. Here it stopped abruptly (fig. 5). Manual pressure then was exerted carefully in an effort to disinvaginate the bowel, but without success. The infant was immediately taken to the hospital and

Fig. 5 (case 2).—Barium in water injected into the colon which has passed upward beyond the splenic flexure and across the transverse colon for about 3 inches and then has stopped abruptly.

operated on. Intussusception was not found. The ascending colon and the first part of the transverse colon were twisted into a mass and were blue. This twisting was relieved by the surgeon, and the infant made an uneventful recovery.

I realize the danger of drawing conclusions from one successful case, but I am offering this article with the idea of presenting a new technic. Intussusception is sufficiently infrequent in this country for one observer scarcely to hope to obtain an impressive series of cases without waiting a long time.

Partial disinvagination is the greatest danger in using this method. It can be recognized as I have pointed out. This treatment is not offered with the idea of supplanting the surgical treatment, but it will save certain patients from the dangers of operation.

459 James Street.

PHYSICAL DEFECTS IN A THOUSAND CHILDREN

A STUDY OF THREE DISTINCTIVE SOCIAL GROUPS *

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In an earlier study [1] a comparison was made of the physical defects found in two groups of children by the use of a standardized examination of physical growth.[2] Recently, I have had occasion to tabulate the defects appearing in the records of a group of children examined in my private practice on the basis of the same examination. These three groups total 1,000 cases, and it seems well to bring all the material together in a single paper as evidence of conditions found by one physician with reference to the prevalence and significance of these defects.

This examination of physical growth is also used in my work with physical fitness classes in various schools and colleges. In association with it a social examination is given and, in cases of special need, a mental examination. Considerable data on various "social defects" have been published in various reports on the college work.[3]

The need of standardization in these examinations is increasingly evident. In an earlier paper, attention was called to the results secured in examinations made by three physicians working under the rules of a municipal health department in which they were all experienced. Two hundred and sixty-six children were examined consecutively but independently by each of three physicians. Their observations showed agreement in only 75 per cent of the children in the matter of carious teeth and in only 63 per cent with reference to the presence or absence of diseased adenoids and tonsils.

In this paper, the data have been obtained from three fairly distinctive social groups. The first includes 245 dependent children in the Little Wanderers' Home in Boston, who were sufficiently well to attend school and to engage in the ordinary activities of normal children. The second is made up of 357 children coming to the clinic of the Massachusetts

* Received for publication, Dec. 22, 1926.

1. Emerson, William R. P.: Physical Defects in Children: Report of Six Hundred and Two Cases, Am. J. Dis. Child. **21**:282 (March) 1921.

2. Emerson, William R. P.: A Nutrition Clinic in a Public School, Internat. Clin. **4**, series 29, 1919; Nutrition and Growth in Children: Chapters on "The Case History," "The Physical-Growth Examination," "The Mental Examination," "The Social Examination." D. Appleton and Company, 1922.

3. The College and Physical Fitness, Dartmouth Alumni Magazine, February, May and November, 1925, and December, 1926. Massachusetts Institute of Technology Publications, vol. 60, no. 11, pp. 11-22. Emerson, William R. P.: Physical Fitness in the College, J. A. M. A. **86**:1511 (May 15) 1926.

General Hospital for examination and treatment. The third consists of 398 children, for the most part from well-to-do families, whose records were taken consecutively in my private practice.

From the observations arising from the data concerning the children in the group in my private practice, it appears that care of teeth has made great progress during recent years in American families who live on higher economic levels. Not only are the members of the dental profession more adequately equipped than was the case a few years ago, but also both they and the parents have a much higher standard that is well carried into effect. This standard is working its way down the economic scale, and increasingly wide ranges of families are coming to expect as a matter of course that hygiene of the mouth will be well attended to. An encouraging development in this connection is the tendency of dentists and orthodontists to see the problems of the care of their patients in direct relation to health diagnosis and health intelligence. There is still too much strain put on children undergoing dental care, especially when oral deformities have developed because of obstructed breathing and similar causes. When, however, a dentist examines a child every six months, he is able to come to a better understanding of health as a whole and to take responsibility for something more than the mere correction of outstanding oral defects.

It is equally clear that parents and family physicians have still a long way to go before they are ready to accept a like responsibility for doing away with nasopharyngeal obstructions which have far reaching effects on health. Clinical studies of many thousands of cases during the growing period show conclusively that underweight, malnutrition and physical unfitness are more often the result of this cause than of any other. The tables published in this and earlier papers show that advance has been made in better cared for families but that much still remains to be done before this aspect of health requirements will be brought up to the present standard of dental efficiency.

Physical defects include not only inflammatory processes but also deformities brought about by these conditions and by acute and chronic diseases. I have found both inflammatory processes and postural defects closely associated with underweight. In practically all studies the correlation between dental defects and underweight has been found to be uncertain at the best and often definitely negative.

Reports concerning physical defects in children have been published frequently. Therefore, I take this opportunity to include here some data concerning the relation of nasopharyngeal defects and underweight taken from work with older persons during the growing period which may fairly be taken to represent "end-results" of comparatively recent work in pediatrics.

In a physical fitness class at the Massachusetts Institute of Technology, the men averaged 5.8 physical defects. Forty-three per cent of these defects were concerned with the nasopharynx and 22 per cent were postural. (In the groups included in the present study, the number of defects ranged from 4.6 to 6.8 of which from 40 to 52 per cent were nasopharyngeal and from 20 to 30 per cent postural.) In the group from the Massachusetts Institute of Technology 36 per cent had been operated on previously for diseased adenoids and tonsils. In the entire freshman class the percentage was 36, while at Harvard it was 50. I found in the freshman class of the Massachusetts Institute of Technology that the men who were in what is called the danger zone of weight (7 per cent and more underweight for height) showed an incidence of 2⅓ times the number of acute respiratory diseases than appeared in the men in the safety-weight zone (average weight to 20 per cent above average). In Davenport's study [4] this ratio was 3⅓. I have data concerning the rates of gain of men who deferred recommended operations in this field and those who did not require operation. In the class at the

TABLE 1.—*Relationship Between Number of Physical Defects and Gain in Weight*

Physical Defects Group	Gain in Weight, per Cent
From two to four defects	378
From five to seven defects	310
From eight to ten defects	153
From two to ten defects	333

Massachusetts Institute of Technology, the latter group made 160 per cent of the gain in weight accomplished by the former. At Dartmouth College the advantage of those who did not require operation was 193 per cent last year and 150 per cent this year. At St. Xavier High School in Cincinnati the percentage was 200.

Table 1 illustrates the relationship found between the number of physical defects and the gain in weight.

Whenever there is a failure to gain in weight, for which there is no apparent cause found, a rule is made to reexamine the nasopharynx and accessory sinuses. It has been found necessary in some cases to have further operative procedure, although the patient has had as many as three previous operations that had been performed inadequately.

Another suggestive field of correlation between physical fitness and physical defects appears in many cases of idiosyncrasies for food. A large proportion of these are psychologic in nature, and it is fortunate that the technic of protein and similar tests is developing so adequately that it is now possible in many instances to determine which of these antipathies have an actual physiologic basis and which of them call for

4. Davenport: Body-Build and Its Inheritance, published by the Carnegie Institution of Washington, Washington, D. C., December, 1923.

TABLE 2.—*Distribution of Physical Defects in Present Study (Three Hundred and Ninety-Eight Children)**

Physical Defects	Boys, 223		Girls, 175		Both Sexes, 398	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Underweight	182	82	126	73	308	77
Nasopharyngeal	478	212	259	148	737	185
Adenoids	15	8.3	8	4.6	23	5.8
Pathologic changes in tonsils	60	27.0	45	26.0	105	26.0
Mouth breathing	96	42.0	44	26.0	140	35.0
Granular pharynx	87	38.0	54	31.0	141	35.0
Adenitis	1	....	0	....	1	....
Enlarged turbinates	9	4.0	1	....	10	2.5
Deviated septum	13	5.8	2	1.0	15	3.8
Enlarged ant. cervical glands	111	49.0	61	35.0	172	43.0
Perforated drums	1	....	0	....	1	....
Thickened drums	82	37.0	44	25.0	126	32.0
Rhinitis	3	....	0	....	3	....
Ear	19	8.5	19	11.0	38	9.5
Otitis media	1	....	1	....	2	....
Cerumen	18	8.5	18	11.0	36	9.5
Eye	5	2.5	3	1.7	8	2.0
Strabismus	4	2.0	2	1.0	6	1.5
Conjunctivitis	1	....	0	....	1	....
Granular lids	0	....	1	....	1	....
Teeth carious	9	4.0	2	1.0	11	2.9
Skin	10	5.0	8	4.5	18	4.5
Acne	0	....	1	....	1	....
Eczema	6	2.7	6	3.4	12	3.0
Scabies	1	....	1	....	2	....
Ichthyosis	1	....	0	....	1	....
Dermatitis	2	....	0	....	2	....
Respiratory	5	2.2	3	1.7	8	2.0
Bronchitis	1	....	2	....	3	....
Asthma	1	....	1	....	2	....
Tuberculosis	3	....	0	....	3	....
Heart	2	....	0	....	2	....
Valvular	1	....	0	....	1	....
Functional	1	....	0	....	1	....
Hernias	2	....	1	....	3	....
Genito-urinary	20	9.0	19	11.0	39	9.8
Enuresis	9	4.0	11	6.3	20	5.0
Pyelitis	3	1.3	8	4.5	11	4.3
Adherent prepuce	3	1.3	..	....	3	....
Undescended testicle	5	2.2	..	....	5	....
Rickets	4	2.0	4	2.3	8	2.0
Worms	1	....	2	....	3	1.0
Postural	366	165.0	250	142.0	616	154.0
Fatigue posture	118	53.0	80	45.0	198	50.0
Round shoulders	116	52.0	91	52.0	207	52.0
Lateral curve	23	10.0	21	12.0	44	11.0
Lordosis	6	3.0	1	....	7	2.0
Rigid spine	1	....	0	....	1	....
Pigeon chest	1	....	3	....	4	1.0
Flat and pronated feet	95	42.0	54	31.0	149	37.6
Knock knee	5	2.5	0	....	5	1.0
Bow legs	1	....	0	....	1	....
Defect in thyroid	0	....	1	....	1	....
Anaphylaxis	9	4.0	7	4.0	16	4.0
Defect in brain	2	1.0	2	1.0	4	1.0
Convulsions	2	1.0	0	....	2	1.0
Total	1,116	500.0	706	400.0	1,822	460.0
Average per child	5.0		4.0		4.6	

* The figures given are taken from the reports of initial examinations. In many cases additional defects are discovered later.

TABLE 3.—*Distribution of Physical Defects*

	Present Study			Little Wanderers			Massachusetts General Hospital		
	Male, per Cent	Female, per Cent	Both, per Cent	Male, per Cent	Female, per Cent	Both, per Cent	Male, per Cent	Female, per Cent	Both, per Cent
All defects	100	100	100	100	100	100	100	100	100
Underweight	17	18	17	5*	5*	5*	10	11	10
Nasopharyngeal	43	37	40	48	50	49	52	50	52
Postural	32	35	34	15†	12†	14†	13†	15†	14†
All others	8	10	9	32	33	32	25	23	23
(Teeth)	1.0	0.3	0.7	11.5	10.5	11.0	10.0	10.5	10.5

* See summary, section 5.
† See summary, section 6.

TABLE 4.—*Average Number of Physical Defects at Various Ages and in the Various Groups Studied*

	Per Cent of Total Group	Average				
		All Defects	Underweight	Nasopharyngeal	Postural	All Others
Present Study, 398 Cases						
Ages						
3 and less	15	3.6	0.63	1.8	0.7	0.4
4 to 6 years	25	4.3	0.75	1.8	1.3	0.5
7 to 9 years	26	5.5	0.83	1.9	2.0	0.5
10 to 12 years	22	5.1	0.95	2.0	1.9	0.4
13 and over	12	4.5	0.73	1.7	1.7	0.3
	100	4.6	0.79*	1.8	1.5†	0.45
Little Wanderers, 245 Cases						
Ages						
3 and less	12	5.0	....	3.9	...	...
4 to 6 years	21	5.0	....	2.5	...	...
7 to 9 years	23	5.1	....	2.3	...	...
10 to 12 years	18	6.0	....	3.3	...	...
13 and over	17	4.3	....	2.4	...	...
	100	5.0	0.27*	2.5	0.7†	1.0
Massachusetts General Hospital, 357 Cases						
Ages						
3 and less	9	6.0	....	3.6	...	...
4 to 6 years	23	6.9	....	3.5	...	...
7 to 9 years	30	7.2	....	3.6	...	...
10 to 12 years	28	6.9	....	3.8	...	...
13 and over	6	6.9	....	3.0	...	...
	100	6.8	0.75*	3.5	1.0†	0.8

* See summary, section 5.
† See summary, section 7.

TABLE 5.—*Number of Defects Per Individual*

Number of Defects	Present Study, Both Sexes, per Cent	Little Wanderers, per Cent	Massachusetts General Hospital, per Cent
None	3.0	1.6	1.4
One	5.8	3.2	0.6
Two	12.3	9.9	1.4
Three	13.0	13.9	3.4
Four	15.3	14.6	7.1
Five	12.3	13.6	9.1
Six	13.6	13.0	15.2
Seven	11.0	12.6	21.7
Eight	5.5	9.8	23.7
Nine	4.5	2.9	9.8
Ten	1.4	3.7	3.5
Eleven	1.7	0.8	2.0
Twelve	0.6	0.4	1.1
Three and less	34.1	28.6	6.8
Four to seven	52.2	53.8	53.1
Eight to twelve	13.7	17.6	40.1
Five and less	61.7	56.8	23.0
Six to 12	38.3	43.2	77.0
None to twelve	100.0	100.0	100.0

control by other means. A Dartmouth freshman failed to make any progress until it was found that he could not assimilate milk. When this was eliminated from his diet he gained 7 pounds in as many weeks. A supposed antipathy may militate against gain in weight, but naturally it calls for social rather than physical control.

COMMENTS

An adequate examination of physical growth should show an average of from four to six physical defects per child. The term physical defects is used here to include inflammatory processes, the results of inflammatory processes, defects of posture and physical abnormalities, both congenital and those occasioned by breathing through the mouth and by acute and chronic diseases.

Of these defects about 50 per cent are associated with inflammatory processes of the nasopharynx and about 30 per cent are postural. The postural defects appear for the most part to be secondary to other conditions.

In general the greater number of the defects found, the greater the percentage of underweight; the greater the number of physical defects, the less gain in weight and, conversely, the fewer the defects the greater the gain. The rate of gain in weight is in general most seriously affected by defects causing nasopharyngeal obstructions, which interfere with free breathing necessary for good health.

Defects of the nasopharynx are most frequently overlooked, as the usual attitude of even the specialist is that unless the process is bad enough to demand early operation—as, for example, badly diseased adenoids or tonsils—other conditions are disregarded.

When the first of these examinations were made, the percentage of nasopharyngeal obstructions seemed large in comparison with studies reported by other physicians. Naturally this aspect of the matter has been considered carefully since that time, and it is interesting to note that the later tabulations fully justify the earlier figures.

The usual medical physical examination, even when carefully made, discovers only about half of the significant defects actually present. The chief reason for this is that these examinations are for the purpose of detecting actual disease instead of seeking abnormal processes that interfere with health.

The early detection and prompt correction of physical defects are fundamental in promoting good health and proper development during the growing period.

SUMMARY

1. *Social Groups.*—Three hundred and ninety-eight children of well-to-do families examined in private practice averaged 4.6 physical defects of all kinds and 1.8 nasopharyngeal defects; 245 dependent children in

the Little Wanderers' Home, reported to be sufficiently well to attend school and to engage in the ordinary activities of normal children, averaged 5.2 physical defects of all kinds and 2.5 nasopharyngeal defects; 357 children brought to a hospital clinic for examination and treatment averaged 6.8 defects of all kinds and 3.5 nasopharyngeal defects.

2. *Age.*—In each of the three groups the greatest number of children were in the 7 to 9 age division. There were more defects in this age division in the group from private practice (5.5) and in the hospital group (7.2), but the highest average in the Little Wanderers' group was in the 10 to 12 age division (6.0). The group from private practice showed more than 50 per cent increase from the youngest age division to the highest rate. In the groups from the Little Wanderers' Home and from the hospital, the highest average of defects was 20 per cent increase over the youngest age division.

3. *Freedom from Defects.*—Twenty children of the 1,000 were free from physicial defects—eleven in the group from private practice, four from the Little Wanderers' Home and five from the group from the hospital.

4. *Sex.*—In the earlier studies the difference between the sexes is slight but in the group from private practice the girls average one defect less than the boys. The age divisions show little difference in the sexes, but in the number of defects per individual the girls show nearly a fifth more than the boys in the five defects and less section. The proportion is higher for girls in each section from no defects through four defects and falls off rapidly from five through nine but varies little in from ten to twelve defects. The distribution of nasopharyngeal defects also varies little with the sexes in the former studies but in the group from private practice the boys show about 40 per cent more of this class of defects. The percentage of adenoids and tonsils showing pathologic changes varies little, but the difference lies mainly in "mouth breathing," "granular pharynx," and "enlarged anterior cervical glands."

5. *Underweight.*—The percentage of cases of underweight in the private practice and hospital groups ran fairly uniformly from 67 to 79. The group from the Little Wanderers' Home was on a 10 per cent underweight for height basis instead of the 7 per cent used in the other groups, but even when correction is made for this difference the percentage there ran less than half that of the others.

6. *Nasopharyngeal Defects.*—Nasopharyngeal defects appeared in a larger number of patients and also totaled a greater number of defects than any other class. The group from the hospital averaged nearly double that of the private practice (3.5 to 1.8). These defects were remarkably uniform at various ages, the only exception appearing in the

group from the Little Wanderer's Home, in which the 3 years and less age division showed the highest incidence appearing in all the studies (3.9). The distribution among the sexes was uniform, except that the group from private practice showed greater incidence among boys than among girls.

7. *Postural Defects.*—The term "fatigue posture" was not used in examining the groups from the Little Wanderers' Home and the hospital. This defect accounts for about a third of the postural defects in the group from private practice, and when allowance is made for this, difference in the three groups is remarkably uniform. The incidence of flat and pronated feet is much greater in the later studies, the result in part of an increasing appreciation of their significance.

8. *Other Defects.*—The most striking difference between the group from private practice on the one hand and the groups from the Little Wanderers' Home and the hospital on the other is in the more successful care of the teeth in the former group. Pediculosis appeared frequently in the latter children but naturally not at all among those in private practice. Enuresis seems to be about equally prevalent in the three groups.

9. *Effectiveness of Physical Examinations.*—There has been little opportunity for comparing the results of the examination of these children in private practice with those obtained by any other method, but further experience in other situations confirms the statement made in the summary of the previous article to the effect that the examination of physical growth reveals nearly twice as many significant defects as appear in the general examinations given the same children in hospital clinics and that frequently not half of the defects found in such examinations are recorded in the formal diagnostic summary. The greatest discrepancies occur in nasopharyngeal and postural defects and defects in the teeth in the order named.[5]

10. *Correlations.*—Further study fully confirms the statements made in the earlier papers concerning the significance of nasopharyngeal obstructions as causes of underweight and physical unfitness and also the significance of postural defects in the diagnosis of physical unfitness and malnutrition.

In general, the greater number of physical defects is associated with less gain in weight and, conversely, the patients who have the less number of defects show greater gain. Gain in weight is affected most by nasopharyngeal defects. Usually the higher percentage of underweight is associated with a greater number of defects in the patient.

5. Emerson, William R. P.: Nutrition and Growth in Children, p. 38.

STREPTOCOCCIC MENINGITIS OF OTITIC ORIGIN

REPORT OF A CASE *

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AND
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MINNEAPOLIS

Streptococcic meningitis of otitic origin with recovery is interesting in that a limited number of cases in which treatment was successful have been reported. In reviewing the literature, we find that in 1918 Walthall[1] states that the mortality of the disease is more than 90 per cent, and that not until 1893 was any serious attempt made to treat meningitis of suppurative otitic origin. At that time, Macewin reported, according to Walthall, six recoveries out of twelve cases. On the other hand, McCarthy[2] reports that up to 1917 a search of the literature reveals nine reported cases of recovery in which the streptococcus was found in the spinal fluid. Of these nine cases, six were considered as having their origin in an infection of the middle ear; two showed a mastoid infection, and in the last case the origin was unknown. In 1919, Weaver[3] of Chicago reported a case of acute streptococcic meningitis with recovery. Then Yerger,[4] in 1922, gives a statistical study based on sixty-three cases of meningitis of otitic origin in which the patients were admitted to the Cook County Hospital, Chicago, from 1911 to 1920, inclusive. There were 1,254 cases of a suppurative condition of the middle ear in sixty-three of which meningitis developed, and there were 1,188 cases of meningitis of all kinds, sixty-three of which were of otitic origin. The infection of the middle ear was found on clinical examination in fifty-seven cases, in which the disease was acute in thirty-three and chronic in twenty-two cases. Bilateral infection occurred in seven cases and mastoiditis in thirty-five, of which twenty were acute and fifteen chronic. Of the sixty-three cases, only two patients recovered, a mortality of 97 per cent. One patient gave a positive reaction for the streptococcic organism, the other a negative one.

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1. Walthall, D. O.: Recovery of a Case of Purulent Meningitis Complicating Mastoiditis, J. Michigan M. Soc. **17**:102 (March) 1918.

2. McCarthy, F. P.: A Case of Streptococcus Meningitis Successfully Treated with Normal Serum (Human), Boston M. and S. J. **177**:621 (Nov.) 1917.

3. Weaver, G. H.: A Case of Acute Streptococcus Meningitis with Recovery, J. A. M. A. **72**:1362 (May 10) 1919.

4. Yerger, C. F.: Meningitis of Otitic Origin, J. A. M. A. **79**:1924 (Dec. 2) 1922.

Finally, in 1922, Mygind [5] reports data on 210 cases of meningitis of all forms caused directly or indirectly by acute and chronic suppuration of the middle ear. Of these, 115 were uncomplicated, that is, there were not any other intracranial infections. Thirty-eight patients recovered, nearly half of which were children between 5 and 14 years of age. Twenty-three of the latter group of cases gave a cloudy spinal fluid, and bacteria were found in four cases: pneumococcus twice, streptococcus once, and in one case the type of organism was not mentioned. Thus it appears that only one case of meningitis with streptococci in the spinal fluid is found among Mygind's cases in which recovery took place, and therefore the following case is reported:

REPORT OF CASE

History.—A white boy, aged 7, was admitted to the pediatric ward of the Minneapolis General Hospital, March 16, 1926, with the complaint of fever and chills, loss of appetite and earache of three days' duration. The earache was most marked on the right side. The past history revealed that the patient had had measles and chickenpox at the age of 4 and 5, respectively, and three months previously, the tonsils and adenoids had been removed. The family history was unimportant.

Physical Examination.—The boy was well developed and nourished, resting quietly in bed, complaining of earache. He did not wish to be disturbed, and almost failed to respond when questioned. The temperature was 102.2 F. with a pulse of 120 and respiration of 24. The patient's face was flushed, and the skin was warm and dry. There was not any rash or eruption present. The throat was inflamed, and the ear drums were injected at the periphery and were bulging. There was some tenderness over the left mastoid. The cervical glands were enlarged, and the remainder of the examination was unimportant.

Laboratory Examination.—The urine was normal. The blood revealed a hemoglobin of 85 (Sahli), a red cell count of 4,890,000, a leukocyte count of 22,400, with a differential count of 88 per cent polymorphonuclears and 12 per cent lymphocytes. The Wassermann, von Pirquet and Mantoux tests were negative.

Progress.—Several hours after admission, a bilateral myringotomy was performed under ether anesthesia. A moderate amount of pus was obtained on both sides. Following this the patient became fairly comfortable, but the temperature remained around 102 F. and he refused to eat. The ears began to discharge a little pus mixed with considerable blood. On the morning of March 18, which was the third hospital day, he was uncomfortable, complaining of headache and photophobia. The fingers were cyanotic, and further examination revealed marked rigidity of the neck with moderate spasticity of both upper and lower extremities. Kernig's sign was positive on both sides. A spinal puncture was performed immediately, and the spinal fluid obtained under pressure gave a cell count of 2,680, all the cells being polymorphonuclears. The patient now did not have any earache or mastoid tenderness, but both ears were discharging yellow pus, the left ear more than the right. The patient was becoming more and more stuporous, and the temperature was around 103 F. A consultation was held with Dr. F. Pratt and Dr. V. Schwartz, otolaryngologists, and it was decided that a bilateral mastoid operation should be performed as soon as possible. At operation, mastoid cells with a definite pyogenic membrane were found filled with pus, more so on the left than on the right side. The organism present in the mastoid pus was a hemolytic streptococcus. The day following the operation, the temperature

5. Mygind, H.: Benign Forms of Otogenic Meningitis, J. Laryngol. and Otol. **37**:597 (April) 1922.

remained around 104 F., and the patient was stuporous. Examination revealed marked rigidity of the neck and moderate spasticity of the upper and lower extremities. Spinal fluid was obtained under increased pressure. Spinal puncture was now performed daily, and in the accompanying table the laboratory reports are given. On the second day after operation, the patient was less stuporous. The spasticity of the upper extremities was less marked. There was now a gradual improvement, so that on the ninth day after operation the patient was fully conscious, taking nourishment fairly well and not complaining. The temperature now was ranging from normal to 100 F. The spasticity of the upper extremities had almost disappeared, while the rigidity of the neck and the spasticity of the lower extremities were decreased. The improvement continued so that on April 2, the sixteenth day after operation, the patient's condition was good, spinal puncture revealing only 25 cells in the spinal fluid.

On April 3, the cell count rose to 4,380 and on April 5, the temperature was 100.6 F., the patient being irritable. Dr. H. Hannah, neurologist, was called in consultation, and he advised spinal irrigations with physiologic sodium chloride solution. These were performed twice daily until April 15, when they were reduced to one daily, the patient now not showing any evidence of meningitis clinically. The general nutrition was only fair. Finally, on May 8, irrigations were discontinued, the patient's condition being good. The temperature was normal; he was up and about in the ward; appetite was good, and he did not complain of any discomfort. Physical examination revealed an active boy of good nutrition, in that he had gained 6 pounds (2.7 Kg.) since April 14. Behind each ear was a well healed mastoid scar, and the remainder of the examination was negative. Mental examination showed normal intelligence.

Comment.—In reviewing this case, it is interesting to note that the symptoms of meningitis occurred soon after the onset of the disease of the middle ear, in spite of the fact that both ear drums were punctured early so as to facilitate drainage. As soon as the diagnosis of meningitis was made, immediate surgical intervention was considered, in spite of the condition of the patient. With a diagnosis of meningitis, complicating infection of the middle ear, a mastoid operation was decided on as the only procedure that would possibly help the patient. This procedure, it appeared, was the only chance the patient had for recovery. Walthall states that when meningitis complicates otitis media, a mastoidectomy should be regarded as an exploratory operation and should be resorted to with the same freedom as in doubtful abdominal conditions. Yerger states that twenty-nine of his sixty-three patients were operated on, a simple mastoid operation being performed in twenty-one cases, a radical one in five cases, and a cranial exploration in eight cases. The two recoveries that he reports both occurred in patients who were operated on, one being a simple and the other a radical mastoid operation. Mygind states that in all of his recoveries in the group of uncomplicated meningitis of otitic origin an operation was performed except in one case. He now performs a simple mastoid operation in all his cases of meningitis of otitic origin.

Following the operation, improvement was soon noted in the general condition of the patient, although the spinal fluid still revealed an active infection of the meninges. As will be noted, a smear of the first spinal fluid was positive for the pneumococcus organism, but after that the streptococcus organism was reported present. Of the sixty-three cases considered by Yerger, twenty-nine showed positive smears for micro-organisms, and cultures were positive in fourteen cases: eight streptococcus and six pneumococcus. Only one of the patients with the streptococcus organism present in the spinal fluid recovered. In our case the bacteria soon disappeared from the spinal fluid with repeated spinal punctures, and not until the eighteenth postoperative day were bacteria again found, cultures then revealing an active hemolytic streptococcus. It was now that the so-called spinal irrigations were started. An ordinary spinal puncture was performed, and from 20 to 30 cc. of spinal fluid was allowed to flow slowly into a sterile tube. This was sent to the laboratory. A rubber tube was connected with the barrel of

an ordinary 20 cc. Luer syringe, and then inserted into the end of the needle by means of an adapter. By gravity, 20 cc. of physiologic sodium chloride solution was allowed to flow into the spinal canal, and then the syringe was lowered below the level of the patient on the table, the fluid being allowed to syphon off. After 20 cc. had been removed, then the syringe was emptied and raised above the level of the patient. Twenty cubic centimeters of physiologic sodium chloride solution was again allowed to flow slowly into the spinal canal. This process was repeated from four to six times twice daily. The patient at first had severe headaches following this procedure, but later he did not complain.

Laboratory Examination of Spinal Fluid

Date, 1925.....	3/18	3/20	3/21	3/22	3/23	3/24	3/25	3/26
Appearance								
Color.....	.....	.....	.....	.....	.....	.....	.....	.....
Transparency.	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Milky	Cloudy
Protein (Nonne)	1 plus	2 plus	.....	2 plus	1 plus	1 plus	1 plus	2 plus
Cell count.....	2380	1200	1500	1000	1820	1400	1250	750
Cytology.....	P.M.N.*	P.M.N.	.....	.....	.....	.....	P.M.N.	.....
Bacteria.....	Pneumo.†	Strep.‡	None	Strep.‡	Strep.‡	None	None	None

Date, 1926.....	3/27	3/28	3/29	3/30	3/31	4/1	4/2	4/3
Appearance								
Color.....	.....	.....	.....	.....	.....	Yellow	.....	.....
Transparency.	Milky	Milky	Cloudy	Cloudy	Milky	Cloudy	Clear	Cloudy
Protein (Nonne)	2 plus	1 plus	1 plus	1 plus	2 plus	Trace	1 plus	2 plus
Cell count.....	1040	1250	9	1180	2150	218	25	4380
Cytology.....	.....	.....	.....	.....	.....	.....	.....	.....
Bacteria.....	None	Pneumo.†	None	None	None	None	None	None

Date, 1926.....	4/4	4/6	4/7	4/8	4/9	4/10	4/11	4/12
Appearance								
Color.....	.....	.....	.....	.....	.....	.....	.....	.....
Transparency.	Cloudy	Clear	Cloudy	Clear	Clear	Clear	Clear	Clear
Protein (Nonne)	2 plus	Trace	1 plus	Trace	Trace	Trace	Trace	Trace
Cell count.....	1870	208	620	250	85	240	173	250
Cytology.....	.....	.....	.....	.....	.....	.....	.....	.....
Bacteria.....	Strep.‡	None	None	None	None	None	None	None

Date, 1926.....	4/13	4/14	4/15	4/19	4/20	4/22	4/24	4/26
Appearance								
Color.....	.....	Yellow	Yellow	.....	.....	Yellow	Yellow	Yellow
Transparency.	Clear	Clear	Clear	Clear	Clear	Cloudy	Cloudy	Cloudy
Protein (Nonne)	Trace	.....	1 plus	Trace	Trace	Trace	Trace	1 plus
Cell count.....	95	300	690	433	664	1000	975	450
Cytology.....	.....	.....	P.M.N.	.....	.....	.....	.....	.....
Bacteria.....	None	None	None	None	None	None	None	None

Date, 1926.....	4/28	4/30	5/3	5/5	5/7	5/8	5/14	5/18
Appearance								
Color.....	.....	Yellow	.....	.....	.....	.....	.....	.....
Transparency.	Clear	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Clear	Clear
Protein (Nonne)	1 plus	Trace	1 plus	Trace	1 plus	Trace	Negative	Negative
Cell count.....	160	560	350	700	254	450	23	35
Cytology.....	.....	P.M.N.	.....	.....	.....	.....	.....	.....
Bacteria.....	None	None	None	None	None	None	None	None

* P.M.N. indicates polymorphonuclears; Pneumo., pneumococcus; Strep., streptococcus.
† Culture study of the spinal fluid containing the pneumococcus gave negative results in that there was not any growth.
‡ Culture study of the spinal fluid containing the streptococcus revealed an active hemolytic streptococcus.

The accompanying table shows that these spinal irrigations brought the cell count down to less than 1,000. When it was observed that the cell count remained less than 1,000 and that the patient was making rapid progress, the irrigations were reduced to one daily, and then every other day. Finally the interval was lengthened to one week. It is certain that these spinal irrigations reduced the cell count and also that not any bacteria were then reported. Although the patient may have recovered, nevertheless with the sudden flare-up on the sixteenth postoperative day, it was thought best to try these irrigations with physiologic sodium chloride solution. Some good probably might be done and certainly not any harm.

At the operation, Drs. Pratt and Schwartz made a careful and thorough examination for the path of infection of the meninges. They were unsuccessful. Yerger states that it is sometimes difficult or impossible at operation to determine the path of infection, and that it may be by local extension, either by continuity or contiguity of tissue, or by a hematogenous or lymphogenous process. Davis[6] performed thirteen autopsies in cases of meningitis of otitic origin and made a careful study in regard to the path of infection. He reports that the path of infection in seven cases was traced through the fenestra ovalis to the labyrinth and to the internal auditory meatus, thence to the under surface of the pons and the cisterna interpeduncularis. In one case there was a thrombosis of the lateral sinus with a collection of pus around the sinus, and covering the under surface and the posterior aspect of the cerebellar hemisphere. In another case a collection of pus was found in the aqueduct of the vestibule and appeared to reach that position along the saccus endolymphaticus. In the remaining four cases not any path of infection was found, and they may have been blood infections.

SUMMARY

1. A case of bilateral otitis media and mastoiditis is reported with meningitis as a complication. This meningitis yielded a spinal fluid positive for pneumococcus by smear, and for streptococcus by smear and culture. The streptococcus was of the hemolytic type.

2. A bilateral mastoid operation was immediately performed, improvement following rather rapidly after the operation. This operation was considered the only chance the patient had for recovery at the time that he developed meningeal symptoms in the presence of the infection of the middle ear.

3. Spinal irrigations were tried without any ill results, and they were probably of some aid in hastening the recovery.

4. The path of infection from the middle ear and mastoid to the meninges was not determined.

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6. Davis, E. D. D.: The Morbid Anatomy and Drainage of Otitis Meningitis, J. Laryngol. and Otol. **38**:427 (Aug.) 1923.

ANTHOCYANINURIA

REPORT OF A CASE

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DETROIT

In reporting this case, attention is called to a condition which apparently occurs rarely, that is, pigmentation of the urine following the ingestion of red beets (beta vulgaris), and which might readily be mistaken for other conditions in which red pigment appears in the urine, especially when in combination with such symptoms and history as are presented by this child.

Jack D., aged 6 years, was admitted to the Children's Hospital of Michigan on Oct. 15, 1926, because of periodic reddish discoloration of the urine, failure to gain in weight and attacks of abdominal pain.

During infancy he was breast-fed for only six weeks and when placed on a diet of cow's milk mixtures developed severe rickets. At the age of 2½ years he had a severe attack of tonsillitis, following which the mother was informed that he had suffered injury to the heart. From that time until tonsillectomy was performed in the fall of 1925, he complained periodically of rheumatic pain in the limbs; after tonsillectomy, he complained of precordial pain and shortness of breath on exertion. He had also had measles, mumps and whooping cough without any apparent sequelae.

In May, 1926, the patient had a severe attack of scarlet fever, and during convalescence passed smoky urine which was said to contain albumin and blood. Since then he had never been well; he slept poorly, was restless, did not gain and complained of epigastric pain at frequent intervals immediately following meals; he felt nauseated but did not vomit.

On five occasions after the attack of scarlet fever he passed red or reddish-brown urine; the attacks lasted from two to three weeks, as in the last instance, and the urine varied from a faint brownish pink to a deep red. Each time he was put on a milk diet, on the assumption that the color was the result of a recurrence of the nephritis, and that the milk caused the color to disappear. The patient was referred to the hospital because microscopic examination showed the urine to be free from blood.

The diet contained a few vegetables, but pickled beets had been eaten frequently. The boy had not been having medication of any sort.

Examination showed a malnourished child with mild choreiform movement. The heart was irregular and slightly enlarged; there was a precordial thrill, and a loud systolic murmur was heard over the apical region. Urinalysis showed: specific gravity, 1.015; color, deep wine; acid; no albumin, sugar, urobilinogen, bile, acetone or blood. Examination of the blood showed: hemoglobin, 70 per cent; white blood cells, 9,000; polymorphonuclears, 38 per cent; lymphocytes, 62 per cent; the cells were normal in appearance.

The blood serum was of normal color. The nonprotein nitrogen (blood) was 30 mg. per hundred cubic centimeters. The Wassermann test of the blood was negative. The von Pirquet test was negative. Roentgen-ray examination of the paranasal sinuses showed them to be apparently normal. Spectroscopic examination of the fresh urine and alcoholic solution of the residue were negative for pigments derived from blood. Acid solution did not show the presence of bands characteristic of hematoporphyrin.

Following admission, the child was put on a beet-free diet and the urine became clear on October 17. Beginning on October 18, beets were given three times a day, with another patient on the same diet acting as a control. The urine varied from pink to deep red until twenty-four hours after the beets were discontinued. The control did not show any red in the urine. The patient was discharged from the hospital on October 23.

The red in the urine was changed to deep yellow on addition of alkali such as potassium hydroxide solution or sodium hydroxide and returned when the urine was again made acid with hydrochloric acid or acetic acids. Aqueous solution of beet juice reacted in the same way to acid and alkali.

As the patient had an elevation of temperature of from 99 to 100 while in the hospital, he was kept in bed at home under the physician's care because of endocarditis and rheumatic symptoms. On November 28, the parents reported that he had been treated for the heart condition for two weeks in another hospital and that the urine had remained entirely clear of red color except when he was fed beets.

COMMENT

Palmer,[1] quoting Formanek, states that the red of beets undoubtedly is caused by anthocyanin which changes to yellow under certain conditions, the absorption bands of this yellow pigment being identical in position to carotin, the cause of the change at present being unexplained.

In this case, the presence of the dye in the urine probably is the result of a change in permeability of the kidney from injury done by the nephritis following the attack of scarlet fever, as it had never appeared prior to that time.

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1. Palmer, L. S.: Carotinoids and Related Pigments, Chemical Catalog Co., New York, 1922.

PROGRESS IN PEDIATRICS

VON JAKSCH'S ANEMIA

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DETROIT

The question whether or not von Jaksch's "anemia pseudo-leukemica infantum" is entitled to retain a place in medical nomenclature seems still to be unsettled. In spite of the fact that many authors, especially Americans,[1] have expressed themselves definitely as in favor of dropping the name, on the ground that it does not connote any distinct disease entity, the diagnosis is still made in not a few clinics [2] by men whose opinion is entitled to weight, and who seem to feel that it has a special significance. The English use the term freely, though apparently with some hesitation as to separating it definitely from "infantile splenic anemia," which some of them seem to consider as distinct from the splenic anemia of later years.[3] On the continent the name seems to be in general use, though perhaps without any unanimity of opinion either as to diagnostic criteria or as to etiology and pathogenesis. The whole subject is still much confused, and it seems worth while to inquire whether the growth of hematologic knowledge and the more thorough study of cases offers a possibility of clarifying it. The question is of real importance, not only because the whole subject of anemias is still blind and accurate diagnosis and clear-cut distinctions are badly needed, but also because, with the present vogue of splenectomy, it is especially desirable to obtain as definite ideas as possible as to what classes of patients may be helped by this operation. There are already in the literature too many reports of "cures" in cases that cannot be classified satisfactorily from the information given.

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1. Morse, J. L.: Clinical Pediatrics, Philadelphia, W. B. Saunders Co., 1926. Griffin: Clinical Observations Concerning Twenty-Seven Cases of Splenectomy, Am. J. M. S. **145**:781, 1913; Splenectomy for Splenic Anemia in Childhood and for the Splenic Anemia in Infancy, Ann. Surg. **62**:679, 1915. Bartlett, F. H.: Indications for the Removal of the Spleen in Infants and Young Children, Am. J. Dis. Child. **23**:283 (April) 1922. Krumbhaar, in Pearce, Krumbhaar and Frazier: The Spleen and Anemia, Philadelphia, J. B. Lippincott Co., 1918.

2. Stillman: A Study of Von Jaksch's Anemia, Am. J. M. S. **153**:218, 1917. Pool and Stillman: The Surgery of the Spleen, New York, D. Appleton & Co., 1923. Minot, quoted by Cooley, Witwer and Lee (footnote 12).

3. Parsons, Thursfield, Parkes-Weber, Rolleston: Symposium on Splenic Enlargements, Proc. Roy. Soc. Med., Sect. Dis. Child. **9**:19 (Feb.) 1926. Ashby and Southam: Splenic Anemias of Young Children Treated by Splenectomy, Brit. M. J. **1**:411 (March 6) 1926. Ward: On the Nature of Von Jaksch's Disease, Brit. J. Child. Dis. **15**:101, 1918.

It seems unnecessary here to review again in detail the history and the voluminous and confused literature of the subject, as this has been done often enough. Dating as the history does from a period when hematologic study was still in its early stage of development, it is not surprising that one should find reported, under any classification originating at that time, many cases that obviously cannot belong in the same group, a large proportion of which, with adequate data, would probably now be classified elsewhere.

DESCRIPTION AND DIFFERENTIATION

Von Jaksch's original description,[4] as might be expected from the time it was written, was far from clear. His main points were the appearance of the anemia in infancy or early childhood, the strikingly large, hard spleen, with some hepatic swelling, a high leukocytosis, sometimes above 100,000, and pronounced changes in size and shape in the red cells, with varying degrees of anemia of a chlorotic type. He did not emphasize the occurrence of nucleated erythrocytes, nor did he lay so much stress as some subsequent writers have on the appearance of white cells of the marrow series. He helped, I think, greatly to cloud the whole question by speaking of a pronounced tendency to recovery. The inclusion of this as a feature of the disease seems to have led to the classification of many ordinary secondary anemias under this name.

Since his reports were published, widespread interest in blood study and numerous case reports have modified this conception materially. It was early evident that von Jaksch's own description did not sufficiently identify any distinct clinical entity; yet most of the commentators seemed to feel that there were cases that did not fit readily into any other existing classification, and that might well be grouped under the name proposed by von Jaksch. The early discussion was largely as to whether or not such cases should be considered as a form of "primary" anemia, and this view found not a few proponents. Somewhat later came the idea of a peculiar type of secondary anemia, perhaps depending on a particular exciting cause, such as rickets or syphilis; and then, in accordance with the general development of hematologic theories, the argument reached its present stage, in which three main points of view may be distinguished: (1) von Jaksch's anemia is not a thing that can be differentiated satisfactorily from the ordinary secondary anemias of infancy, in which the symptomatology is remarkably varied, and the gradations in the blood and the pathologic pictures are so numerous and so slight that it is impossible to draw any sharp line of demarcation;[5]

4. Von Jaksch: Leukemia and Leukocytosis in Childhood, Wien. klin. Wchnschr. **2**:435, 1889; Diagnosis and Treatment of Diseases of the Blood, Prag. med. Wchnschr., 1890, p. 387.

5. Footnote 1. Finkelstein: Anemias of Earliest Childhood, Berl. klin. Wchnschr., 1911, p. 1829.

(2) there is a fairly constant, recognizable clinical picture of an anemia developing in infancy or early childhood as a result of rickets or of the metabolic disturbance causing rickets, and this anemia is what von Jaksch attempted to describe;[6] (3) corresponding closely to current theories regarding other peculiar anemias, this type is a "biologic variant" of the ordinary secondary anemia, resulting from rickets, syphilis, or other exciting cause, and depending for its peculiar symptomatology on some congenital weakness or abnormality of the blood-forming mechanism, "not a special entity, but an extreme reaction."[7]

In the course of the discussion there has grown, on the part of those who accept the idea of a distinct clinical entity, a more clearly outlined picture than that of von Jaksch, while those who would drop the classification still seem to think of it as implying nothing more definite than an anemia occurring in infancy, and characterized by leukocytosis, splenic enlargement, and a tendency to recovery. Of those who stand for a separate classification, Eppinger[8] and Pool and Stillman[9] have given good summaries of the situation, Eppinger's being especially complete, with a full bibliography. His description of the disease, though written from the standpoint of the pathologist, and expressly disclaiming clinical knowledge, is one of the best, and corresponds so closely, as far as it goes, with the definition I shall attempt to give later that I shall mention only the main points now. He emphasizes the gravity and chronicity of the disease process, the remarkable size and firmness of the spleen and the moderate enlargement of the liver. He brings out, too, the peculiarities in the red cells, especially the almost constant appearance of numerous normoblasts and megaloblasts, and speaks of a moderate leukocytosis, with frequent occurrence of cells of the marrow series. His conception is evidently of an essentially chronic, and often progressively fatal, disease, and he does not mention any tendency to recovery. He evidently thinks of von Jaksch's disease as a secondary hemolytic anemia, and lays much stress on Glanzmann's experiments in the production of hemolysis by overfeeding of milk fat.[10] These are

6. Marfan: Rickets: Osteo-Lymphatism of Infancy, Traite de Méd. et de Therap., Gilbert et Thoinot, **39**:235, 1912. Fischl: Pathogenesis of Infantile Pseudoleukemic Anemia, Med. klin. **21**:1077 (July) 1925. Aschenheim and Benjamin: The Influence of Rickets on the Hemopoietic Organs, Arch. f. Klin. Med. **95**:259, 1909; **105**:470, 1912.

7. Naegeli: General Viewpoints on the Anemias, Schweiz. med. Wchnschr. **55**:1043 (Nov.) 1925; Blutkrankheiten und Blutdiagnostik, Leipzig, 1912; Hallez: Anemia with Splenomegaly in the Infant, Nourisson **8**:154, 1920; **9**:24, 1921. Mensi: Nature of Pseudoleukemic Anemia, Pediatria **30**:652 (July) 1922. Beretervide and Bianchi: The Anemia of v. Jaksch-Luzet, Arch. de méd. d. enf. **28**:144, 1925.

8. Eppinger: Die Hepatolienalen Erkrankungen, Berlin, Julius Springer, 1920.

9. Footnote 2 (second reference).

10. Glanzmann: Quantitative Urobilinogen Determinations in the Stool in Anemias of Children, Jahrb. f. Kinderh. **84**:95, 1916.

certainly interesting, particularly in regard to some types of nutritional anemias, but I doubt their bearing on this particular condition. His description of pathologic observations is important, as he has been associated with this phase of the question from the beginning. The colored illustrations of sections from the spleens in his book are exceedingly good.

His description seems to be fairly clear and to outline a disease process hardly to be confused with the ordinary secondary anemia. It is a question, however, whether it is to be considered complete, and whether further study may not add other distinguishing features to define still more sharply a characteristic disease entity among the heterogeneous reported cases.

In reviewing the literature, one is struck by the lack of evidence of adequate study of metabolism of pigment. I think that any student of the hemolytic anemias must realize that absence of jaundice and urobilinuria, especially if the latter is not frequently looked for, is not sufficient to exclude any given case or series of cases from this group. Eppinger seems to have been impressed by the frequent absence of studies of the pigment in case reports, and expresses his regret at this frequently.

Another thing that has come to be of decided importance in classifying the splenic anemias is the effect of splenectomy. There are now on record a considerable number of splenectomies for "von Jaksch's anemia," and the nature of the effect obtained would certainly seem to have an important bearing not only on the possible relationship of the cases, but also, to a certain extent, on the nature of the anemia itself.

REVIEW OF CASES

In attempting anything like a critical review of the reported cases with all these points of view in mind, one is, as has been said, handicapped by the lack of important information that one would like to have, and one finds oneself obliged in consequence to record impressions rather than clearly drawn conclusions.

First of all, it seems impossible to avoid a feeling that the various men who have reported single cases or groups cannot all have had the same condition in mind, and that the cases cannot all belong in the same group. Certain cases in which there was prompt and surprising recovery after splenectomy suggest strongly the possibility of hemolytic icterus, especially when the patient was noticed to have a "subicteric" or a greenish-yellow color. Hemolytic icterus was, of course, little known in the early days of the discussion of von Jaksch's disease. Other patients who recovered after splenectomy may have belonged properly in the "splenic anemia" group, using that term in the sense of Banti. Of the considerable number of cases exhibiting a tendency to spontaneous

recovery or to recovery under ordinary medicinal and hygienic treatment, it is easy to say of some of them that they belong to the class of which Finkelstein, Morse and others have written as being obviously ordinary secondary anemias modified by the peculiar reaction of the hemopoietic tissues in this age period, and possibly by coincident syphilis, rickets or peculiar nutritional factors. In another group one might question whether, if the patients had been followed sufficiently, the recovery might not have proved more apparent than real. One such case has been observed in this clinic, in which the patient apparently recovered completely, but the peculiar characteristics in the blood picture persisted, modified only in degree. A similar thing happens in what Gänsslen [11] calls "compensated" hemolytic icterus.

With regard to an etiologic connection between rickets, syphilis, or other exciting causes and the peculiar anemia, one is confronted again by a frequent lack of complete description of cases and a lack of unanimity in the conception of diagnostic criteria. As far as rickets is concerned, it seems fair to point out what has often been said before, that in the great majority of cases rickets is not accompanied by any characteristic anemia; that when the two are coincident, severe von Jaksch's anemia may accompany mild rickets and severe rickets may show only a mild grade of the anemia, while even fatal cases of anemia are observed in children who do not manifest any evidence of rickets whatever. Furthermore, recovery from the two diseases, when they occur together, is not coincident.

On the whole, it is probably just to say that grave anemia coincident with rickets, whether or not it is considered as falling within the von Jaksch classification, is more likely to be the result of the same hygienic and dietary faults that caused the rickets, though there is still room for the idea that rickets or any other constitutional disturbance might bring into evidence a congenital fault in the hemopoietic mechanism constituting a special "anemic diathesis."

In proportion to its relative frequency, congenital syphilis or parental syphilis seems to play a more definite part in the case reports than does rickets, especially in the Italian literature. There is a considerable proportion of the cases in which syphilis was proved in one or the other parent, and sometimes (less often) in the child. These cases seem also to have been more severe, and to conform more closely with the description of Eppinger than do most of those associated with rickets. They cannot be considered "syphilitic anemias" because they are not cured by antisyphilitic treatment. One would be justified in believing either that the syphilitic taint may at times cause a peculiar defect in the

11. Gänsslen: Hemolytic Jaundice, Deutsches Arch. f. klin. Med. **140**:210 (Sept.) 1922. Gänsslen, Zipperlen and Schüz: Hemolytic Constitution, ibid. **146**:1 (Jan.) 1925.

hemopoietic system, or, more likely, that it is especially prone to aggravate such a congenital fault. That cases showing an identical clinical picture are observed in nonsyphilitic families speaks for the latter view.

This idea of a characteristic anemia resulting from some one of a variety of pathologic stimuli to a hemopoietic system congenitally inadequate or congenitally disposed to aberration in a particular direction is attractive in theory and has its analogs in other forms of anemia. The conception of a "hemolytic diathesis" as a partial explanation of pernicious anemia, hemolytic icterus and sickle-cell anemia has a foundation in clinical observation and not a few enthusiastic adherents; almost any one with much clinical experience of the aplastic types of anemia, as well as of some of the peculiar forms accompanying nutritional disorders, must have been convinced that only on the basis of some special defect of metabolism or of the blood-forming tissues can one account for the peculiar and grave reactions in certain persons to conditions that in others give rise to ordinary secondary anemias. In the particular anemia under discussion, this theory might be developed in one of two ways: either that, given an inadequate blood-forming mechanism, the nature of the pathologic stimulus might determine the character of the response, or that a peculiar abnormality of the hemopoietic tissues determines the reaction to any sufficient stimulus. Referring again to the frequency of syphilis in case histories, it might fairly be supposed that this disease may be a cause of such a congenital abnormality.

It has previously been intimated that the inclusion of additional criteria might help to define more sharply a peculiar disease in the vague group of reported cases, and that the metabolism of pigment and the reaction to splenectomy should be given consideration.

There are certain cases in the literature and known to me by private communication that were characterized by a striking and unique response to splenectomy, when this operation was performed, and some of which have shown abnormalities of metabolism of pigment and other peculiar features. Stillman,[2] in the *American Journal of Medical Sciences*, and Pool and Stillman,[2] in "The Surgery of the Spleen," have presented full and interesting discussions of von Jaksch's anemia, which they believe should be kept separate from other splenic anemias, partly, at least, on the basis of the different reaction to splenectomy. They report five cases in which splenectomy was performed, with results so little successful in all but one that one wonders why they should speak of a better effect from operation as distinguishing this disease from pernicious anemia. Of their five patients, none were proved to be syphilitic; two were rachitic, and one had had malaria. Two were twin brothers. Three, the only ones on whom this examination seems to have been made, showed slightly increased fragility, and the urine contained urobilin. One had a high

percentage of reticulated red cells and another a "subicteric" pigmentation of the skin. These three are suggestive of congenital hemolytic jaundice but differ from this disease in the lack of evidence of heredity, in the strikingly different response to splenectomy and in the histologic characteristics of the spleens. The remarkable thing about the reaction to splenectomy was that all five showed, after the operation, varying but extremely high percentages of nucleated red cells, declining after a time but persisting in one to a marked degree for at least six years. The authors consider this case unique. Their description of the spleens removed corresponds well with Eppinger's description of the observations in von Jaksch's disease, and not with those supposed to characterize hemolytic icterus or splenic anemia. They lay stress on the occurrence in the spleen of areas of myeloid metaplasia, though two of their specimens lacked this feature.

Witwer, Lee and I [12] have reported five cases from our own and two from other clinics of what we believe to be a peculiar form of hemolytic anemia, in one of which (case 5) splenectomy was performed in our hospital, with the same remarkable increase in nucleated red cells as observed by Pool and Stillman, though it is too early to say whether it will persist for as long a time as in their case. This patient also had a high percentage of reticulation, and was jaundiced, but did not have increased fragility and showed another pigment instead of urobilin in the urine. Since our paper was submitted for publication, we have learned from Dr. Blackfan that his patient (case 6) ultimately underwent splenectomy, and when last observed had nearly 150,000 normoblasts, as compared with 12,000 before the operation. We have knowledge of one other unreported case,[13] in which a similar "erythroblastic crisis" followed splenectomy. This reaction is like that often seen following splenectomy in pernicious anemia and occasionally in hemolytic jaundice, but it is more extreme and persistent, and is apparently, also, more constant in well established cases. It is interesting and perhaps important to note that in the two youngest of Pool and Stillman's patients the erythroblastic crisis was less marked and of shorter duration than in the older children. Without indulging in theorizing as to the reason for this, it may be supposed to have a possible connection with the apparent fact, mentioned by Pool and Stillman and by Mayo,[14] that early splenectomy offers the best results in von Jaksch's disease; and it may also explain why in some cases which in other respects might have been classified in this group, the erythroblastic crisis was not noticed.

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12. Cooley, Witwer and Lee: A Series of Cases of Anemia with Splenomegaly, Am. J. Dis. Child., to be published.

13. Gittings: Private communication to the author.

14. Mayo, W. J.: Splenectomy in Splenic Anemia and Banti's Disease, J. A. M. A. **77**:34 (July 2) 1921.

A curious fact about this group of cases, for which there is not any present explanation, is that in every case concerning which we have definite information on this point, the children who have had this peculiar reaction after splenectomy belonged to some one of the Mediterranean group of races—Syrian, Greek or Italian. Of our five patients whom we thought should be classified together, three, including the one whose spleen was removed, were Italian. Abt's patient was Syrian, and Blackfan's Greek. Three of Pool and Stillman's five were Italian; the race of the other two is not apparent from the record. Gitting's patient is Italian. This peculiarity led us to think of the possibility of a parasitic infection, especially of leishmaniasis, though the fact that most of the children were American born would seem to preclude this possibility. Dr. F. G. Novy has been good enough to examine the spleen from our patient (case 5) for parasites with negative results.

My associates and I feel that cases such as these of Pool and Stillman, the series that we reported, and others with like characteristics should be definitely distinguished from other forms of anemia. We believe it to be a special form of hemolytic anemia, meaning by that term an anemia in which abnormal hemolysis has an important part in the disease process, and we think it is to be looked on as belonging in the same general group as hemolytic icterus, sickle-cell anemia and pernicious anemia. These four diseases, though obviously differing materially in etiology and clinical course, have much in common in their symptomatology. Before sickle-cell anemia took its place in the literature, the tendency was to think of any hemolytic anemia not corresponding definitely to the type of congenital hemolytic icterus or pernicious anemia as an atypical hemolytic icterus, and it is possible that some cases reported under this title really belong in the group under discussion. Sickle-cell anemia, having so obvious a distinguishing feature as the sickle cell and showing at the same time the high percentage of reticulation previously supposed to be peculiar to hemolytic icterus, has proved the existence of at least two kinds of congenital hemolytic disease, and thus has made it easier to think of a third. Without at present discussing the resemblances and differences between them, we think that our group might be said to take third place in a series of four hemolytic diseases, of which, in the order of symptomatic relationship, hemolytic icterus is first, sickle-cell anemia second, von Jaksch's disease third, and pernicious anemia fourth. Hemolytic icterus has been the subject of considerable attention in recent years, and Gänsslen's study [11] particularly has brought out points of value for the study of any hemolytic anemia. His observations in affected families on the number of authentic cases which lacked one or more of what are considered cardinal symptoms (10 per cent without increased fragility, 35 per cent without anemia, 40 per cent without jaundice, and 30 per cent without

splenomegaly) are particularly interesting with regard to his ideas of a hemolytic diathesis in these families. His observations, taken in connection with his theory of the relation of the microcyte to hemolysis in hemolytic icterus and the knowledge of the peculiarities of the sickle cell, are at least suggestive of possible explanations of the fundamental diathesis in von Jaksch's anemia and of the pathogenesis of the anemia itself. My associates and I hope to discuss these points in another paper. The similarity between certain severe forms of hemolytic icterus and pernicious anemia has often been pointed out. Sickle-cell anemia, as far as present information goes, seems to us to present less of the purely hemolytic character and more of the indications of chronic toxemia, while in von Jaksch's disease the hemolytic factor is perhaps of still less importance in comparison with other features, and the disease process becomes still more like pernicious anemia; though there are still too many differences in blood picture, symptomatology and pathologic histology to justify considering it as the infantile type of pernicious anemia. Naegeli [15] has discussed the similarity between von Jaksch's disease and pernicious anemia, which has been noted by others also.

My associates and I [6] have indicated elsewhere our belief that this condition should be considered a congenital disease rather than a secondary anemia. If it were not for the absence of evidence of an hereditary factor, there would be no more question of this here than in hemolytic icterus or sickle-cell anemia. Most of the cases develop and are noticed in early life, earlier, on the average, than in either of the other diseases, and some of the most severe have developed and have run a fatal course without the appearance of any special pathologic stimulus to bring out or accentuate the disease process. We are inclined to go back to the conception of a "primary" anemia, so far as there can be said to exist any such thing. Present conceptions of all the essential anemias tend more and more to the supposition of a primary diathesis in absorption, metabolism, or a defective hemopoietic system whose pathogenetic effects are often set in motion or aggravated by stimuli of various kinds, and there is no apparent reason for thinking otherwise of von Jaksch's disease.

So far as I am able to draw conclusions from the literature, this hemolytic anemia is the only condition included among reported cases of von Jaksch's disease that is well enough defined to be considered a distinct clinical entity. A question might be raised as to whether it is really the anemia that von Jaksch meant to describe, and whether his name should be continued in connection with it. His own description certainly did not give an adequate picture of the disease, and the tendency to accept it has led to much confusion in the literature. Nevertheless, it is prob-

15. Naegeli (footnote 7, first and second reference).

ably easier to continue to use his name, as has been done throughout this article, and to try to define more accurately the condition to be known by it than to try to introduce a new term.

VON JAKSCH'S ANEMIA

I should therefore describe as follows the disease that I think should be known as von Jaksch's anemia: a hemolytic anemia, having points of resemblance to hemolytic icterus, sickle-cell anemia and pernicious anemia, but having also definite points of difference. It should probably be considered as a congenital disease, sometimes familial, but so far as is known not hereditary. It makes its presence known in infancy or early childhood, and from that time is essentially chronic.

The patients are usually of sallow complexion, and may have a "subicteric" color, or even definite jaundice. Ofter they have a Mongolian appearance, due partly to the color of the skin, and partly to prominence of the bones of the cheek as a result of hyperplasia of the marrow. They are likely to be undersized and to have prominent abdomens because of the splenic and hepatic enlargements. The great size of the spleen, with hard, smooth surface, is a marked characteristic. The liver is relatively not so large or so firm. Moderate hyperplasia of the lymph glands may or may not be present. Secondary phenomena of anemia, cardiac dilatation and murmurs, serous effusions, etc., may be present in proportion to the stage and severity of the disease. Hemorrhages are not common.

In the blood, pigmentation of the serum with positive indirect van den Bergh reaction and raised icteric index are common but not always present. The red cells show marked variation in size and less in shape. Nucleated forms, except in late stages of the disease, are likely to be seen in unusual numbers, and megaloblasts are common. Polychromasia and reticulation are marked—reticulation reaching at times as high percentages as in hemolytic icterus. The grade of anemia is moderate, except in exacerbations due to malnutrition or intercurrent infection, and in the late stages. The color index is usually somewhat low.

As to the white cells, leukocytosis is practically never absent, the average count being near 20,000, though occasional cases and terminal stages may show much higher figures. Lymphocytes are likely to predominate, though this is not an essential feature. Myelocytes and other cells of the marrow series are often seen and sometimes are numerous. The platelets are not especially affected.

Fragility to salt solutions is usually normal. Some cases have shown an increase, but this in itself does not justify classifying them with hemolytic icterus.

In the urine, urobilinogen and urobilin may appear in excess, but for some reason this is not so constant, even in the presence of definite jaundice, as in hemolytic icterus. Other pigments may appear in the urine.

The stools have been observed in some cases to be unusually dark, but quantitative estimations of the total excretion of pigment are reported only once, when it was found much increased.

Though the clinical course is usually chronic, some cases progress rapidly to a fatal termination in infancy or early childhood. Some of the patients having a milder type show pronounced symptoms only under the influence of acute infections or bad nutritional states, just as do some having hemolytic icterus, and in the intervals are apparently well, though careful studies of that blood usually show in slight degree the characteristic picture. Such cases may in part account for the idea of a pronounced tendency to recovery. As the disease is not reported in adult life, it is probable that most of the patients, whose resistance to infection is usually poor, die of intercurrent disease during childhood.

The reaction to splenectomy is characteristic. Soon after the operation the number of nucleated red cells is enormously increased, and remains high for varying periods—sometimes for years. I believe that before the operation the excessive, probably abnormal, erythroblasts were being destroyed by or under the influence of the spleen, and that after the operation they continue in the circulation until, in time, the destructive function is taken up by other parts of the reticulo-endothelial system, or until, with improvement in the fundamental disease process, their formation diminishes. This seems more logical than to suppose a stimulation of the marrow or the removal of a depressant hormone by splenectomy. The results of splenectomy in well-established, chronic cases are disappointing. There is ground for believing that the earlier the operation is performed, the better the prospects are.

So far as the pathologicanatomic picture is concerned, the main interest lies in the spleen and the bone marrow. The spleen is greatly enlarged; the capsule often is thickened, is usually of an even dark red and is tough and tenacious. Signs of perisplenitis are often seen. The spleen is poor in follicles, which have been crowded out by the increase in the pulp, in which erythropoietic or myeloid areas may be present. The vessels are often dilated. There is not the great distention of the sinuses with blood seen in hemolytic icterus.

Both liver and spleen show, in varying degrees, increase in interstitial connective tissue. Some observers have laid weight on the presence of nucleated red cells and myelocytes in the liver.

The bone marrow is usually hyperplastic, and the cortex thin. In some cases these changes are especially marked in the bones of the skull, and may progress to an astonishing degree, the bones being several times thicker than normal. Apparently in the earlier stages both red and white forming elements are increased, while later the red-forming portion is exhausted and trabeculae of new bone appear. Characteristic changes have not been noted in other issues.

CONCLUSIONS

It is impossible, for lack of adequate data, to say how many cases called von Jaksch's anemia have really been examples of this hemolytic disease, but I am inclined to believe that they constitute a minority. Of the remainder, many are probably definitely secondary anemias. These are never, in my experience, essentially hemolytic. The patients may have moderate splenomegaly, leukocytosis and sometimes marked though rather transient changes in the cell picture, including normoblasts and megaloblasts, and may show occasional slight evidence of hemolysis, especially in some of the nutritional forms; but the condition is less sharply defined, less chronic and usually is easily cured. My associates and I do not think that there is reason for confusion here. Whether there is any definite anemia corresponding to von Jaksch's description and dependent on some other peculiarity of the blood-forming mechanism than that which causes the hemolytic disease cannot now be determined, but we think it improbable. We believe that the existence of a characteristic anemia essentially connected with either syphilis or rickets has not been proved.

The idea that von Jaksch's disease should be considered a hemolytic anemia is by no means new. It does not, however, seem to have occurred to any one else to classify it with the group with which we would place it.

News and Comment

POSTGRADUATE CLINICS IN CHICAGO

A series of postgraduate clinics will be held under the jurisdiction of the Chicago Medical Society in Chicago, June 13 to July 8. The registration fee is $10.00. Clinics in pediatrics will be held at the Cook County Hospital by Drs. J. H. Hess, P. Rosenblum, Abraham Levinson, M. L. Blatt and J. K. Calvin.

SCHOOL OF PUERICULTURE

The University of Paris Faculty of Medicine announces a School of Puericulture under the direction of Professor Pinard, with Dr. B. Weill-Hallé as assistant director. Courses under eminent specialists in pediatrics will be given, beginning June 20. All communications should be addressed to Dr. Weill-Hallé, 64 Rue Desnouettes, Paris (XV°).

SUCCESSOR TO DR. HOWLAND APPOINTED

Dr. Edwards A. Park, Sterling professor of pediatrics at Yale University School of Medicine, has accepted the professorship of pediatrics and the position of pediatrician-in-chief of the Johns Hopkins Hospital, Baltimore, and will assume his new duties next September. Dr. Park succeeds Dr. John Howland, who died in London last June.

Abstracts from Current Literature

Anatomy and Physiology

THE CAUSE AND SIGNIFICANCE OF THE NONCLOSING OF THE SUTURES OF THE SKULL IN MEN. L. BOLK, Nederl. Tijdschr. v. Geneesk. **2**:2328, 1926.

In this paper the author discusses the question of the ossification of the connective tissue between the different fragments of the skull. This ossification either does not take place at all in men, or it takes place partly and individually at different periods after the adult age has been reached, and the brain no longer grows. The consequence of this fact is that the sutures of the skull and the bones of the face remain open. This is contrary to the fact that, normally, the ossification of these sutures occurs in the other mammalians, also in the group of the higher organized primates to which man belongs zoologically. The significance of the sutures for the enlargement of the skull is generally accepted, but they remain open also after the function of the sutural connective tissue is finished. The author gives two reproductions, one of the skull of a woman who died at the age of 96, which still possessed a nearly complete system of sutures, and one the skull of a woman of 46, in which all sutures were closed. The condition of the system of sutures of the skull has, therefore, no value in estimating the age of an individual. The author cites Ribbe and Frédéric, who demonstrated that generally the ossification of the skull in men occurs earlier and more frequently than in women, but that the intensity of the process is different in the different sexes.

In other papers published during later years, the author has indicated that the origin of the form of our body and of our specific bodily characteristics must be explained in quite another way than is done at present, under the influence of the theory of evolution. Lately, the author has given a new theory of the origin of the form of men (Das Problem der Menschwerdung, Jena, Gustav Fischer, 1926). One of the chief principles of this theory is that all specific human characteristics have one common origin. The specific bodily characteristics of man are regarded as being the consequence of a retardation in the individual development during the historical development of men, a retardation that can go so far that finally a fetal condition still exists at the moment when the growth is finished. The real characteristics of man, according to this "fetalization hypothesis," all have a fetal character. On the ground of this hypothesis, the author replies to the question as to what is the cause of the nonclosing of the sutures of the skull in men. The retardation of the development, as suggested by this hypothesis, may be demonstrated in two directions: in the development of the form and in the differentiation of the tissues. The connective tissues now belong to the tissues that undergo several differentiations during development. The nonclosing of the connective tissue, often occurring in the sutures of the skull, is an example of the retardation of the ossification in this tissue. The retardation principle in itself as a factor in evolution is not wholly specific for man.

As regards the retardation in the closing of the sutures of the skull there are even animals who are superior to men. Bolk mentions a small monkey, *Chrysothrix sciurea*, in which closing of the sutures does not take place at all. It is interesting, as Bolk has observed, that as regards the closing of the sutures of the skull, different human races have not reached the same stage;

so, for instance, the white races are more fetalized than the black; the closing of the sutures occurs earlier and more quickly in negroes than in white races. The same difference exists with regard to the symptom of metopism, i. e., the nonclosing of the suture of the os frontale. This occurs in white races much more frequently than in black races. The same difference may be found between different types of white men, i. e., between homo nordicus and homo alphinus of the Northwestern part of Europe, the former being generally more fetalized than the latter. It is to be expected that this original and stimulating hypothesis of Bolk will give in the near future many explanations of anatomic and pathologicanatomic problems in man.

S. VAN CREVELD, Amsterdam.

Pathology, Bacteriology and Biochemistry

PATHOLOGIC CHANGES IN LUNG TISSUE. W. F. MANGES, J. A. M. A. **87**:987 (Sept. 25) 1926.

An aspirated foreign body in any portion of the tracheobronchial tree will sooner or later cause extensive injury. There is great variation as to the length of time a foreign body may be present without causing extensive changes, but those that interfere with drainage do, as a rule, cause injury early. The permanent pathologic change is distal to the point at which drainage is blocked. The foreign body is at or distal to this point. The end results are in the nature of atelectasis, fibrosis, bronchiectasis and chronic abscess, with varying quantities of purulent exudate. Hemorrhage is common; tuberculosis is often suspected but is rarely present. The author believes that many of the onesided, chronic, basal infections are the result of foreign body regardless of history or of roentgenographic shadow of foreign body. Such lesions should at least be investigated bronchoscopically, and many should be treated in this manner.

BONAR, Salt Lake City.

THE PLASMA PROTEINS IN RELATION TO BLOOD HYDRATION: III. THE PLASMA PROTEINS IN MALNUTRITION. J. P. PETERS, A. M. WAKEMAN and EISENMAN, J. Clin. Investigation **3**:91 (Feb.) 1927.

In this further study on the relation between edema, undernutrition and the protein content of the blood, the plasma protein was determined in nineteen cases in which a severe malnutrition existed from a variety of causes, such as anemias, cancer or tuberculosis. In every instance low figures were found. "It is suggested that reduction of the plasma proteins in individuals without obvious cardiac disease or nephritis of the types associated with hypertension and uremia is an indication of previous protein starvation and at least a contributory cause of cachectic and starvation edemas."

EPIDEMIC PREVALENCE IN THE LIGHT OF EXPERIMENTAL FINDINGS. L. T. WEBSTER, J. Clin. Investigation **3**:465 (Feb.) 1927.

This report is the result of a study of epidemics of mouse typhoid and rabbit leptisepticus produced experimentally under carefully controlled conditions. Dosage was rigidly regulated by administering to each animal a definite number of organisms by way of the normal portal of entry. Virulence was controlled by standard methods of culture. An attempt to standardize host susceptibility was made by using pure strains of mice reared and kept under similar environmental conditions and of nearly the same age and weight.

Control curves showing mortality were determined by using the same dosage in various groups and were found to be practically identical. Working then with three known factors, host susceptibility, dosage and virulence, and with results obtained by varying any one of these and keeping the other two constant will show the influence of that particular factor.

In the spread of disease, microbic dosage and not virulence was found to be the important variable. In keeping with this, it has been demonstrated experimentally that, during the course of epidemics of mouse typhoid the number of bacilli available to a given population increases from a negligible quantity to several millions from six to eight days before the onset of an epidemic, and drops below the critical point a few days preceding the decrease in mortality. Rates of morbidity and mortality indicate susceptibility to a given dose of microbes and not changes in microbic virulence.

LESLIE, Chicago.

EFFECTS OF LIGHT ON NORMAL RABBITS, WITH ESPECIAL REFERENCE TO THE ORGANIC REACTION: I. CLINICAL AND POSTMORTEM OBSERVATIONS. II. ORGAN WEIGHTS. III. ANALYSIS OF ORGAN WEIGHTS. LOUISE PEARCE and CHESTER M. VAN ALLEN, J. Exper. Med. **44**:483 and 502, 1926.

I. A group of fifty normal male rabbits kept under conditions of constant light that had none of the shorter ultraviolet rays and another group kept in constant darkness for from two to twelve weeks were observed clinically and subjected to postmortem examination for the purpose of determining the effect of these environmental conditions on general body health and the weights of organs. A similar group of fifty rabbits caged in an ordinary animal room, for the same period, and two groups of forty and twenty rabbits, respectively, which had recently been brought into the laboratory, served as controls.

The general health of the rabbits was not impaired by the artificial light or by the exclusion of light. The gain in body weight which occurred in all groups was especially marked in the case of those kept under conditions of constant light.

The incidence of spontaneous disease recognizable clinically during the experiment was extremely low and of a mild character and did not obviously disturb the health of the animal. It was found at postmortem examination, on the other hand, that 59.3 per cent of the rabbits caged indoors, that is, in the light, dark or unaltered rooms, and 58.3 per cent of those recently brought to the laboratory, had visible lesions of some kind. The great majority of these lesions, however, were of a slight grade, and none appeared to have any deleterious effects on the general physical state of the animals.

II. The weights of the organs are presented in tabular form. The actual weights are given in table 1 and the relative weights, or the weights per kilogram of net body weight, in table 2. In both tables the order of organs and of animal groups is the same. For comparison, observations obtained from a series of 350 normal rabbits are given first. (2) Then follow the results of this experiment in the order of light and dark room animals and inside and outside controls. With the exception of the outside controls, these major divisions are divided into five groups, comprising ten rabbits each, and corresponding to the two, four, six, eight and twelve week periods of exposure to the environments of the experiment. There were only four groups of outside controls. Finally, results are given for twenty normal rabbits examined on March 12, 1925, midway in time between the fourth and fifth experimental groups.

III. An analysis has been made of the organ weights of normal rabbits exposed to a constant illumination having none of the shorter ultraviolet rays and of other rabbits kept in darkness for periods of from two to twelve weeks.

The environment of constant illumination was associated with a well marked decrease in the relative weights of most organs, and in certain instances this occurred when the organ weights of the controls were becoming increasingly large. There was also an associated effect of stabilization of organ weight.

The majority of the organs of rabbits caged in constant darkness also showed a tendency toward decreased and stabilized weights, but these effects were less pronounced than in the rabbits caged under conditions of constant illumination. A notable exception to this general result was the weight of the liver, which was markedly increased.

The results of this experiment support the conception that there is a relationship between light and the physical state of the animal organism which may be expressed in the concrete form implied by the tend or direction of organ weight.

AUTOPLASTIC THYMUS TRANSPLANTS: II. WITH PARTICULAR REFERENCE TO THE REGENERATION OF THE RETICULUM CELLS AND THE FORMATION OF HASSALL'S CORPUSCLES. HENRY L. JAFFE, J. Exper. Med. **44**:523, 1926.

Regeneration of a thymus transplant is characterized by hypertrophy and hyperplasia of the reticulum cells, leading to the formation of small and large atypical Hassall bodies during the early stages.

Regeneration is usually complete by the third week, when the newly formed lobules show differentiation into cortical and medullary zones, and typical Hassall bodies appear.

Typical Hassall corpuscles are also derived from the reticulum epithelial cells.

These corpuscles have no function, being aggregates of spent cells.

The thymus reticulum cells are actively phagocytic, and react rapidly when noxious influences are exerted on the gland.

THE NATURE OF THE TOXIN-ANTITOXIN FLOCCULATION PHENOMENON. J. J. BRONFENBRENNER and PHILIP REICHERT, J. Exper. Med. **44**:553, 1926.

Animals immunized with the formalinized filtrates of young toxic cultures of *Bacillus botulinus* produce an antitoxic serum poor in precipitins.

Animals immunized with the formalinized filtrates of old and partly autolyzed toxic cultures produce an antitoxic serum containing precipitins.

Animals immunized with toxin-free autolyzed bacteria produce a serum free from antitoxin but rich in specific precipitins.

Animals immunized with the filtrates of an atoxic variant produce a serum free from antitoxin but rich in precipitins for the homologous toxin.

Animals immunized with the washed bacteria of the atoxic variant produce a serum that does not contain any antitoxin, but is rich in precipitins for the homologous toxin.

Removal of the precipitins by flocculation with a nontoxic antigen does not materially reduce the antitoxic value of a serum.

Removal of the proteins of the antigen by acid coagulation removes the specific precipitable substance.

All the serums that contain precipitins produce the specific flocculus when combined with homologous toxins, anatoxins or the filtrates of the atoxic

variant. The flocculation is restricted within the type. The amount of the precipitate and the width of the zone vary approximately with the estimated amount of bacterial protein in the antigen that is used for the immunization of animals.

It is concluded, therefore, that the toxin-antitoxin flocculation is a specific bacterial precipitation phenomenon.

EXPERIMENTAL GLOMERULONEPHRITIS INDUCED IN RABBITS WITH THE ENDOTOXIC PRINCIPLE OF STREPTOCOCCUS SCARLATINAE. CHARLES W. DUVAL and R. J. HIBBARD, J. Exper. Med. **44**:567, 1926.

Broth-grown cultures, cultures from blood agar slants and culture filtrates (Berkefeld N or V) of H. *Streptococcus scarlatinae* are without appreciable effect on the rabbit, no matter how large the dose or by what route introduced.

The active toxic principle of H. *Streptococcus scarlatinae* for rabbits is intimately associated with the protein of the bacterial cell, and is not given off in the artificial medium during the growth activity of the organism, indicating therefore, its endotoxic character.

The endotoxin is readily obtained from the variable scarlatinal cultures through the medium of the peritoneal cavity of the rabbit immunized against the homologous strain (Pfeiffer phenomenon). The toxic substance thus obtained we have termed a lysate.

The rabbit is highly susceptible to the in vivo prepared lysate of *Streptococcus scarlatinae,* at least from the cultures we have employed. The degree of the toxic effect on the rabbit depends on the size of the dose and the route through which it is introduced. The specific effects range from mild to severe and fatal forms of toxemia, as indicated by high fever, leukocytosis, paralysis and acute hemorrhagic glomerular nephritis.

The experimentally induced nephritic lesions are analogous in kind and variety to those of acute scarlatinal nephritis in man, including the "epithelial crescent" formation, hyaline thrombi of glomerular capillaries, hemorrhage into capsular space and necrosis of capillary tufts. AUTHORS' SUMMARIES.

ON THE SEROLOGICAL RELATIONSHIP OF ACID-FAST BACTERIA. J. FURTH, J. Immunol. **12**:273, 1926.

There are qualitative differences in the antigenic structure of various acid-fast bacilli. These differences cannot be demonstrated clearly by the direct agglutination tests because of the complete or partial inagglutinability of most of the acid-fast bacilli. Complement fixation and absorption experiments can be successfully applied to the antigenic analysis of this group of organisms. Inagglutinability of acid-fast bacilli is doubtless due in part to a physicochemical interference with flocculation, but it is probable that all receptors detectable by complement fixation are not involved in the formation of flocculi. Mammalian tubercle bacilli have an antigenic structure different from all other acid-fast bacilli. Differentiation within the mammalian group has not been found possible thus far. One atypical bovine strain is an exception to this statement. Avian tubercle bacilli likewise differ qualitatively from all other micro-organisms but they do not form a homogeneous group, for there are at least three avian subtypes. The nonchromogenic strains isolated from patients with leprosy by Kedrowsky and by Duval, and the agglutinable culture of Arloing belong in this group. A serologically distinguishable group of acid-fast bacilli from coldblooded animals does not exist. In antigenic structure these micro-

organisms show little similarity to each other and to other acid-fast bacilli. Acid-fast saprophytes differ qualitatively from all other acid-fast bacteria. Within the saprophytic acid-fast group there is at least one fixed subtype, for strains from various sources such as those designated "Smegma," "Mist," "Milk," "Pseudotuberculosis" and "Butter R" have been found to be closely related if not identical. These observations disprove the hypothesis that acid-fast bacilli possess a common antigen present in varying proportions in various strains, but they show that qualitative differences occur and suggest the possibility that serologic methods may be used to identify acid-fast micro-organisms.

AUTHOR'S SUMMARY (S. A. LEVINSON).

ATTENUATION AND ANTIGENIC POWER OF DIPHTHERIA ANTITOXIN TREATED BY VARIOUS SUBSTANCES. DR. PAUL NÉLIS, Ann. de l'Inst. Pasteur **40**:666, 1926.

Diphtheria toxin dialyzes very little through a collodion membrane, but the toxin which has been dialyzed loses its toxic power rapidly and completely if left in the incubator for an extended period. Ozone destroys the toxin partially. More rapid destruction is brought about by small quantities of sodium oleate at incubator temperature, and by quinine dihydrochloride or quinine bisulphate, the toxin being permanently destroyed by these chemical agents. In all of these cases the toxin which has been modified retains, in varying degrees, its antigenic property, anatoxin being the most active as an immunizing agent. In the preparation of anatoxin it was found that the formol fixes in large part on the dialyzable substances foreign to the toxin.

G. B. RHODES.

BLOOD SUGAR IN INFANTS DURING STARVATION. G. TOSI, Clin. Pediat. **8**:577 (Oct.) 1926 (2 articles).

The glycemic curve in infants reaches its minimum during the first twenty-four hours of starvation. When the blood sugar value reaches its threshold (limit compatible with life), there begins an increase in the glycemia because free glucose is utilized. This recovery in the blood sugar curve is more marked and constant in infants. There is a distinct relationship between carbohydrate consumption, energy requirements, reserve substances and the tolerance of the individual. This equilibrium is perceptibly influenced by the age, weight and body proportions. Older infants seem to tolerate starvation better than nursing infants. The older group can tolerate a strictly water diet for a maximum of fifty hours with impunity. In nursing infants, the maximum is from twenty-four to thirty hours. Fats influence the blood sugar curve because the utilization of ingested fats produces calories which compensate for an excessive drain on the carbohydrate reserve. Proteins given to infants can be a source of blood sugar, so that their administration causes a rise in the glycemic curve. This is quite noticeable in connection with starvation.

ZAMBARANO, Northville, Mich.

CONGENITAL CYSTIC LIVER. MARGRIT TEUSCHER, Beitr. z. path. Anat. u. z. allg. Path. **75**:459, 1926.

Teuscher reports the occurrence of multiple cysts of the liver in two stillborn fetuses. In both, the kidneys were also cystic, and in one there were a few cysts in the pancreas. In one of the author's cases, the liver cysts were

microscopic in size; in the other they could be seen with the naked eye. The cysts were situated in the periportal connective tissue and they were lined by a complete single layer of bile-duct epithelium. Serial sections proved that the cysts occurred in the course of interlobular bile ducts, in none of which could any area of occlusion be found. The small cysts in the pancreas also occurred in the interlobular ducts, which were not occluded. Because of her observations, Teuscher could not accept for her cases the mechanism proposed by von Meyenburg, namely, the development of the duct and parenchymatous portions of the liver from separate anlagen, cyst formation being due to the failure of union of the ducts of the parenchymatous portion with those entering the liver from the hilum, a mechanism which homologizes congenital cystic liver with congenital cystic kidney. Teuscher concludes that congenital cystic liver is the result of a developmental anomaly associated with greater proliferative activity on the part of both the epithelium of the interlobular bile ducts and of the periportal connective tissue. This anomaly involves more especially the embryonic plexus-like hepatic ducts at the hilum described by Hertwig, Lewis and Aron. An inhibitory process (Hemmung) also plays a part, in that some of the small embryonic periportal and intralobular ducts do not undergo the normal regression, and disappearance and may become cystic because of the proliferative activity of the epithelium.

O. T. Schultz.

Biochemistry of Casein. Hugo Meyer, Biochem. Ztschr. **178**:82 (Oct. 30) 1926.

The temperature below which acid precipitation in milk no longer occurs is called the heat precipitation point. This point was found to be constant in the same woman, but women varied from one another as much as 10 degrees (centigrade). Similar variations occur in animals. The casein obtained from breast milk also has a constant heat precipitation point (in the presence of salt) for the same woman, but the caseins from different women vary from one another. Salt free casein, however, always has a constant heat precipitation point.

Gas and Nitrogen Metabolism in Experimental Scurvy in Guinea-Pigs. N. Jarussowa, Biochem. Ztschr. **179**:104 (Dec.) 1926.

On an exclusive oat diet, the animals lost their appetites rapidly, making the experiments difficult. There was a decrease in the consumption of oxygen, and a marked drop in the excretion of carbon dioxide. Addition of from 10 to 40 Gm. of cabbage to the oats increased both the consumption of oxygen and the excretion of carbon dioxide, the duration of the effect running parallel with the amount of vegetable added.

There was a negative nitrogen balance on the oat diet even when there was no drop in weight. Addition of cabbage decreased the nitrogen destruction of the body tissues.

Brahdy, New York.

Investigations on the Carbon Content of Nurslings' Urine. Stephan Ederer, Monatschr. f. Kinderh. **35**:50, 1927.

If the organism is reduced to the minimum nitrogen intake feasible to health, the relation of carbon to nitrogen is an index of catabolism. Under these circumstances the quotient in the nursling is more than 1, usually between

1 and 2. In the adult the quotient is below 1. Artificial feeding changes the quotient by its higher nitrogen. Atrophic infants do not show any change over the normal.

INVESTIGATIONS ON THE CARBON CONTENT OF NURSLINGS' URINE. STEPHAN EDERER, Monatschr. f. Kinderh. **35**:57, 1927.

In the nursling an increase of fat in the diet leads to a larger C/N quotient which results in most cases from a real increase in carbon excretion. Increase of carbohydrate in the diet does not have any such effect. In rickets the quotient is greatly increased, i. e., to 3 or 10. The quotient in rickets seems particularly susceptible to changes in the fat of the diet, much more so than in the normal infant.

Insulin seems to reduce the quotient.

GERSTLEY, Chicago.

SPEED OF PRECIPITATION AFTER THE PIRQUET REACTION. ALFONS TRIAS, Ztschr. f. Kinderh. **41**:331, 1926.

Speed of precipitation of red cells was determined before and after the performance of a Pirquet test. Of seventy children with positive Pirquet reactions, 64.3 per cent showed an increased speed, 10 per cent a slowing and 25.7 per cent remained unchanged. If the test is done from six to eight hours after a Pirquet test, 66 per cent of the children show a definite increase. An increase of 2.5 mm. or more per hour speaks for an infection of tuberculosis, but a failure to increase is not conclusive.

EMERSON, Boston.

BLOOD SUGAR IN THE NORMAL NURSLINGS. KUMATRO GONDO, J. Pediat. (Tokyo) November, 20, 1926, p. 1639.

The author studied the blood sugar in ninety-one infants between the ages of 2 and 25 months. In starvation, the sugar was found to be 0.0908 per cent. The average quantity was 0.088 per cent. Normal breast-fed infants and infants who are fed with food high in carbohydrate content showed the figure of 0.0925 per cent. At 6 months, the average figure was 0.0892 per cent, at 12 months, 0.0862 per cent and above 12 months, 0.0998 per cent. There was no relation of blood sugar to sex, and no special difference as compared with that in the adult, except that the sugar content showed a greater variation in infants than in adults.

KATO, Los Angeles.

Nutrition

ACIDIFIED MILKS IN INFANT FEEDING. VICTOR E. LEVINE, Arch. Pediat. **43**:631 (Oct.) 1926.

This is a lengthy discussion of the various acid milks used in infant feeding. It presents in detail the manner of making each together with the advantages and disadvantages in their use. The chemical composition of the acid milks is presented. For consideration the author discusses the hydrochloric acid milk as recommended by Faber, Hess' citric acid milk, Marriott's lactic acid milk and the acetic acid milk used by Dunham. It seems that the ideal is the lactic acid milk because the hydrogen ion concentration is best suited to digestion and renders the milk sterile as well as antiseptic. Organisms of the colon and dysentery groups are destroyed by lactic acid milk, as are also the typhoid, diphtheria and the tubercle bacillus. The indications for the use of acid milks is discussed.

DIARRHEA IN INFANTS. LLOYD ARNOLD, Arch. Pediat. **44**:71, 1927.

Experimental and statistical studies support the conception of the part played by the stomach in acidifying its contents sufficiently to insure an acid reaction in the upper part of the small intestine. Under these conditions one finds that the contents of this tract are relatively free from bacteria. When the gastric secretory function is depressed, as a result of the elevation of temperature caused by summer heat, then the contents of the small intestine become alkaline and contain many bacteria. The ingestion of acidified food by the infant helps to correct this gastric secretory deficiency by restoring the contents of the duodenum to its normal reaction, and the biologic bactericidal powers that operate under these conditions soon sterilize its contents.

The reduction in diarrheal mortality rate is accompanied by a postponement of the summer increase of deaths from diarrhea in young children farther and farther from the period of effective high temperature. This may be explained in part by the general use of acid buffered foods as a prophylactic for infants showing nutritional disturbances in the summer months.

VON MEYSENBUG, New Orleans.

THE PREVENTION OF RICKETS IN PREMATURE INFANTS. HENRY J. GERSTENBERGER and JOHN D. NOURSE, J. A. M. A. **87**:1108 (Oct. 2) 1926.

The authors concluded that rickets can be prevented and cured in premature infants. The amount of cod liver oil is small, as 3.5 cc. per liter of S. M. A. or S. M. A. skim-milk mixtures prevented rickets in every case, and 2 cc. of cod liver oil per liter of Protein S. M. A. was effective in five out of seven. The two infants that developed rickets on this combination lost it on the same mixture, even though they continued to gain in weight, but at a somewhat slower speed. The average daily intake of cod liver oil for the group was 1.76 cc. It was observed that a daily intake of cod liver oil of 8 cc. for one week produced healing rickets in seven weeks and a completely calcified bone in nine. In prevention of rickets in premature infants, cod liver oil should be administered as soon as food is consumed. Excessive, rapid and great gain in weight should not be encouraged. The food should contain a higher mineral and protein content than does skim milk; and it is suggested that if human milk is used, it should be supplemented with boiled skim milk.

BREAST FEEDING PROBLEMS: I. C. ULYSSES MORE and H. G. DENNIS, J. A. M. A. **87**:1970 (Dec. 11) 1926.

Physicians must stress the fact that every mother who can care for her infant can nurse it, if the mental hazards of motherhood regarding breast feeding are to be overcome. The daily health routine of the lactating mother needs more careful study and regulation by the physician. The amino-acid and vitamin B content of the diet require special attention. Experimentally, a milk diet is inadequate during this period. Abnormal constitutional conditions including contagious disease in the mother should necessitate only temporary artificial feeding. Open tuberculosis is the only absolute contraindication for nursing. Premature weaning is too often the result of remediable conditions in the mammary glands. Breasts and nipples deserve a complete examination. Hypertrophy and hypertonicity of the muscles of the nipple are curable. Aseptic care of the nipple together with routine use of nipple aerators prevent infections, fissures and mastitis. The cancer bugaboo as an excuse for

avoiding nursing or manual expression is refuted by experience and by statistics. Insufficient milk supply is the most common problem in breast feeding. This problem is best solved by manual expression, the technic of which varies with the type of breast. Proper expression assures success.

EFFECTS OF DIET DURING PREGNANCY ON DEVELOPMENT OF RICKETS IN OFFSPRING. J. VICTOR GREENEBAUM, THEODORE K. SELKIRK, FLORENCE A. OTIS and A. GRAEME MITCHELL, J. A. M. A. **87**:1973 (Dec. 11) 1926.

A study was made of the effects of actively regulated diets of pregnant women on the development of rickets in their offspring. These experiments would indicate that if the diet of the mother during the last three months of pregnancy can be made approximately correct in caloric and mineral intake, while it will not prevent rickets, it will have a controlling influence on the development of the disease in her offspring.

ANTIRACHITIC PROPERTIES DEVELOPED IN HUMAN MILK BY IRRADIATING THE MOTHER. ALFRED F. HESS, MILDRED WEINSTOCK and ELIZABETH SHERMAN, J. A. M. A. **88**:24 (Jan. 1) 1927.

Ultraviolet irradiation of a nursing woman brought about a marked increase in the antirachitic potency of her milk. Fractionization of the milk showed that this effect was due to an augmentation in the antirachitic factor. It is suggested that such irradiation should be employed in order to protect infants from rickets and nursing women from the excessive drain of calcium and phosphorus.

BONAR, Salt Lake City.

THE CLINICAL FEATURES OF SCORBUTIC NEURITIS. R. M. STEWART, J. Neurol. & Psycopath. **6**:191 (Nov.) 1925.

Attention is called to the absence of any previous reference to sensory and reflex symptoms due to involvement of the peripheral nerves in scurvy. In this paper the neurologic symptoms of 150 cases of scurvy encountered during the World War are presented. Sensory disturbances, occurring principally in the lower limbs, were found in forty-five patients. Paresthesia of various forms and pain comprised the subjective symptoms, and the pain in many cases persisted a considerable time after the ordinary signs of scurvy cleared up. Objective symptoms manifested themselves chiefly by hyperalgesia and partial anesthesia. In most cases the sensory disturbances were of a patchy distribution over one or both legs, occurring mainly on the outer side of the leg or dorsum of the foot; in a few cases they were symmetrical, as occurs in an ordinary case of multiple neuritis; in one case they were present only around a small area of the trunk. The knee and ankle reflexes varied from exaggeration to absence, and in many cases were unequal. Nerve trunk and muscle tenderness were characteristic. The ordinary signs of the disease usually were present in the form of bleeding and spongy gums, swelling and edema of the legs, associated in many cases with subcutaneous, intramuscular and subperiosteal hemorrhages; the latter were inflammatory in character, for local heat, redness, and swelling always could be demonstrated. The author regards the mode of production of symptoms as the result of a toxic-nutritional disturbance of the nerves associated with trauma from the pressure caused by the hemorrhages.

STACK, Milwaukee.

ACUTE COLITIS IN CHILDHOOD. C. TORRES-UMANA, Rev. franç. de pediat. **2**:407, 1926.

In distinction to the affections of the stomach and small intestine, which may be in the nature of a food disturbance, the author feels that catarrhal affections of the colon are caused practically always by pathogenic organisms. In 150 cases of acute colitis he found in 60 cases the bacillus of gas gangrene, *B. welchii,* frequently in pure culture, in 14 cases streptococci in pure culture, in 12 cases *B. dysenteriae* Flexner and in 3 *B. dysenteriae* Shiga. In many instances the milk could be proved directly responsible for the infection, but flies were also considered an important factor.

Excluding patients with acid stools, the diet should consist largely of carbohydrates with the elimination of albumins of animal origin. Butter milk may be used when the infection is with cocci or *B. welchii.* The author condemns the use of purgatives except in some cases of gas gangrene infection in which he feels that calomel may be of advantage. Repeated enemas may also be harmful. Autogenous vaccine was used with good results in three cases of infection with streptococci and in one with colon bacillus. Marked success followed the generous use of antidysenteric serum in appropriate cases.

THE STOOLS OF THE NORMAL INFANT. R. GOIFFON and GUZMAN BARRON, Rev. franç. de pediat. **2**:647, 1926.

The authors have studied the stools in fifty cases of supposedly normal infants. They find that they contain large quantities of undigested starch, which is not the case in the normal adult stool. It has been stated that the digestion of starch takes place to a great extent in the ascending colon, which is relatively short in the infant. From these observations the authors suggest that starches and cellulose are perhaps not the best types of food for the young infant.

LESLIE, Chicago.

THE HYDROGEN ION CONCENTRATION OF NORMAL AND PATHOLOGIC MILK. W. FREI and H. LIENHARD, Biochem. Ztsçhr. **187**:1 (Oct. 30) 1926.

The milk of cows with mastitis is more alkaline than the milk of normal cows. Healthy cows produce milk with a p_H of 5.9 to 6.1, whereas in the cows with mastitis it often is as high as 7.0. The authors consider milk with a p_H higher than 6.4 as pathologic. There is a corresponding diminution of the titratable acidity in milk from cows with mastitis.

BRAHDY, New York.

THE HYDROGEN ION CONCENTRATION OF THE BLOOD IN ATROPHIC AND DYSPEPTIC INFANTS. ZOLTAN V. BOKAY, Jahrb. f. Kinderh. **110**:40, 1925.

Von Bokay examined the blood for hydrogen ion concentration in three normal infants, fifteen atrophic infants, and two dyspeptic infants. The normal varied between 7.50 and 7.56. Atrophic children had a hydrogen exponent varying between 7.38 and 7.66, normal or slightly more acid. The dyspeptic infants also had a slight acidosis, the two examined having a hydrogen exponent of 7.48 and 7.44, respectively.

EHRMANN, Chicago.

DIET FOR INFANTS DIFFICULT TO FEED. REPORT OF TWELVE CASES. KARL STOLTE, Jahrb. f. Kinderh. **114**:133, 1926.

These infants, all artificially fed, did not gain enough on the usual milk-water-sugar mixtures. At the age of from 4 to 12 months, feedings of liver

sausage, Viennese sausage, eggs and cereals were tried with good results. Short histories in all cases and one chart are given. Two infants died of intercurrent parenteral diseases; the others all improved. The author recommends these feedings only for infants who do not gain on ordinary milk mixtures and stresses the importance of the free administration of fluids.

THERAPEUTIC EFFECT OF IRRADIATED FOOD IN RACHITIC CHILDREN. O. GOTTCHE and M. TOLNAI, Jahrb. f. Kinderh. **114**:199, 1926.

In seventeen cases of clinically well developed rachitis the children received the same food as before plus different amounts of different irradiated food elements, and the therapeutic results were carefully observed clinically and roentgenographically. It was found possible to cure rickets by irradiating a portion of the food the children receive. The most active substance was irradiated cholesterin, second, plasmon, "a casein preparation containing some fat." Irradiated flour or sugar, if mixed with the milk in the usual amounts, was not effective.

EXPERIENCES WITH SCHIFF-MOSSE'S LACTIC ACID MILK. HANS ZIESCH, Jahrb. f. Kinderh. **114**:216, 1926.

Ziesch gives a favorable report about the use of skimmed lactic acid milk and carbohydrate mixtures in different types of feeding disturbances. The technic of preparation is given and the relative cheapness of this "therapeutic" food praised.

PARMELEE, Chicago.

THE SIGNIFICANCE OF EXOGENOUS INFECTION OF THE STOMACH BY COLON BACILLI IN THE DEVELOPMENT OF ACUTE NUTRITIONAL DISTURBANCE. CATEL, Monatschr. f. Kinderh. **35**:97, 1927.

Catel reports three cases of diarrhea in infants. In two fed with breast milk the stomach was full of colon bacilli. In the third, cultures showed a rich growth of lactis aerogenes. The latter as well as one of the cases showing colon bacilli proved fatal.

EXPERIMENTS WITH R. HAMBURGER'S MILK FREE DIET. W. ROEDEL, Monatschr. f. Kinderh. **35**:103, 1927.

Roedel reports eleven patients fed on a milk free diet, the protein and fat being supplied by oil and liver puree. At times the oil was a little too laxative, but on the whole the children took the diet well. In those with a tendency to exudative diathesis the author believes that the diet was beneficial largely because of the loss of body water.

GERSTLEY, Chicago.

ALBUMIN SUPPLY AND ORGANIC ACIDS IN INFANTS. OTTILIE BUDDE, Ztschr. f. Kinderh. **41**:370, 1926.

Because it seemed astonishing that with an increase of albumin in the food of a normal infant which occurs, for example, in the transition from human milk to cows' milk, there should occur a burdening of the organism with acid, this piece of work was undertaken. The problem was whether the increase in albumin as such caused the increased amount of acids or a change in the ion millieu or the form of albumin offered. Throughout the experiment the

same children were used, and the research periods were of several days' duration. Three children, who were likewise observed when transferred from human milk to two-thirds cows' milk and one-third water, were given various preparations of albumin, and the amount of organic acid excreted in the urine was studied. The increase of acid did not exert a definite influence on the food or on any of the different salts. In a single experiment, the giving of great quantities of sodium bicarbonate seemed to result in an increase of organic acids; likewise an unusually high increase of albumin (3 per cent plasmon with milk and water, half and half). The fact ascertained by Gamble and Landsberger that in alkaline urines there may occasionally occur an error in the Van Slyke and Palmer titration method was confirmed.

EMERSON, Boston.

A MILK TEST-MEAL FOR INFANTS. HOLGER MATHIESEN, Acta Pædiat. **6**:145, 1926.

The author studied children under 6 months of age with a test meal consisting of equal parts of milk and barley water. The gastric contents were aspirated after fifty minutes. Electrometric determinations showed that the p_H, on diets of cows' milk, varied between 2.0 and 5.9. With breast milk, slightly higher values were found — from 4.5 to 6. This difference is attributed to the higher buffer value of cows' milk. It was found that the gastric contents of infants with digestive disturbances as a rule had a higher p_H than with normal infants. The results in pyloric stenosis were inconstant.

Titration curves of the gastric contents were obtained in a number of instances. It was found that the buffer value of the gastric contents — that is, the amount of alkali required to cause definite increase of p_H — was slightly greater in those specimens which showed a high acidity at the start.

The author was unable to demonstrate lactic acid in the gastric contents. An attempt to demonstrate the occurrence of peptic digestion by means of formol-titrations was also unsuccessful.

SUMMARY OF A TREATISE ON "RICKETS IN THE DISTRICT OF EJDE, FAROE ISLANDS." R. K. RASMUSSEN, Acta Pædiat. **6**:161, 1926.

In the Faroe Islands, a region with little sunlight, rickets has probably existed for several centuries. Within the past 75 or 100 years, however, there has been a great increase in its incidence. This seems attributable to a change in the diet of the population — animal fats being largely replaced by carbohydrates.

TOXIC EFFECTS OF COD LIVER OIL. ERIK AGDUHR. Acta Pædiat. **6**:165, 1926.

The author has carried out a large number of experiments on various animal species. In general, his results seem to show that daily doses of cod liver oil, between 0.1 and 1 cc. per kilogram of body weight, are harmless. But when 5 cc. per kilogram or more is given, toxic effects are regularly found. Toxic effects were more pronounced when the oil was given subcutaneously or intra-abdominally, than when it was given by mouth or by rectum. Some differences in the toxicity of different specimens of cod liver oil were found.

The symptoms observed varied considerably in different animals. Thus, in calves there were noted diarrhea, polyuria, apathy, eczema, heart affections, diseases of the lungs and gastric ulcers. In mice and rats, on the other hand, exophthalmos, edema and loss of weight were striking. In cats and dogs, the chief disturbances were functional disorders of the heart and interferences

with the estrous cycle. The blood picture showed fairly constant changes: a reduction in the red cells, increased hemoglobin and platelets, and a leukocytosis. In most animals this consisted of an increase in the polymorphonuclear cells, but in calves the lymphocytes were increased.

Extensive pathologic changes are reported. Tubular nephritis is not uncommon. Necroses may occur in the bones, in the pancreas or the liver. In the latter organ, there may be found the lesions of an acute yellow atrophy, or sometimes atrophy of the Kupffer cells alone. At other times there may be extensive hemorrhages in the liver or chronic passive congestion. The changes in the heart are most striking and seem to be more constant than any other lesion. Pigment atrophy, vacuolar degeneration of the muscle cells and peculiar formations in the lumen of the cavities of the heart, which the author calls "thrombus," are described. These do not seem to be identical with thrombi.

The toxic manifestations of cod liver oil seem to show a certain periodicity. They are more pronounced when other vitamins are withdrawn from the food.

CHANGES IN THE HEART PRODUCED BY COD LIVER OIL IN THE FOOD. AXEL HÖJER, Acta Pædiat. **6**:180, 1926.

The experiments of Agduhr illustrating the supposed deleterious effect of cod liver oil on the heart are criticized on the ground that Agduhr's diets may have been deficient in vitamin B. Höjer has found that the heart changes may be prevented by adding yeast to the diet. On the other hand, even in the absence of yeast, heart changes do not occur except with overdosage of cod liver oil. To explain these facts, the hypothesis is put forward that there is an interaction between vitamin A and vitamin B. An excess of vitamin A will react and inactivate some of the vitamin B present.

Agduhr has also studied the stability of vitamin B and finds that it is much more labile than generally supposed. Foods supposedly rich in vitamin B, such as yeast extract, wheat germs and bran, were found after a lapse of many months to have a much lower vitamin content. HOLT, Baltimore.

BLOOD CALCIUM IN DISEASES OF CHILDREN. TEIZO MASUTOMI, J. Pediat. (Tokyo), Nov. 20, 1926, p. 1501.

The author found the amount of blood calcium in normal children between the ages of 9 and 14 to range between 9.6 to 11.6 mg. per hundred milligrams of blood, and he compared the observations in such pathologic conditions as dysentery and enteritis, tuberculosis, pertussis, osteogenesis imperfecta, nephritis, rheumatic fever with mitral insufficiency, indigestion and malnutrition, purpura hemorrhagica, leukemia, and mitral stenosis. He found that there is a slight increase in all these conditions, except in one case of osteogenesis imperfecta in which the figure was 9.0 mg. From this he infers that acidosis, which is often associated with some of the diseases named above, is due to a flow of acid calcium salt which is abundantly stored in normal state in the marrow and other tissues. This increase in the calcium content of the blood in disease may have its source in one or more of the four possible ways, namely, (1) flow of calcium stored in the osseous tissue, (2) decreased deposition of calcium into the bones, (3) decrease in calcium elimination, and (4) increased rate of calcium absorption. The author believes that the first of these is the most probable way of calcium increase. KATO, Los Angeles.

Prenatal Conditions

UNILATERAL SYMMETRICAL CONGENITAL TALIPES IN TWINS. E. J. BERKHEISER, J. A. M. A. **87**:1300 (Oct. 16) 1926.

Only four instances of bilateral clubfoot in multiple gestations were found in the literature and not any reference to the unilateral deformity in both members of twins. A report of the unilateral condition in twin girls is made.

BONAR, Salt Lake City.

CYST OF THE MEATUS IN A PATIENT WITH CONGENITAL SYPHILIS. L. CHATELLIER, Bull. Soc. franç. de dermat. et syph. **33**:506, 1926.

Congenital cysts at the meatus are rare. This one was excised, with a good result.

[ARCH. DERMAT. & SYPH.]

WEAKNESS IN POWER TO GROW AND CONGENITAL DWARFISM. MURK JANSEN, Rev. franç. de Pediat. **1**:529 (Nov.) 1925.

The author discusses factors other than those commonly associated with rickets that may cause interference with skeletal growth. Influences that act during the period of growth impair the power of proper development, and the degree of impairment is proportional to the rapidity of the growth. Cases in which there was not any lack of sunlight or of vitamin D in the diet, but in which some infection was present, showed changes in the bones similar if not identical with those found in rickets. The author also makes a study of the effect of the mother's condition during pregnancy on the child. Illustrations are given showing the increasing failure of proper skeletal development in the successive children in large families, in which as far as could be determined, the only varying factor was the increasing fatigue of the mother with each successive pregnancy.

CONGENITAL DWARF GROWTH. MURK JANSEN, Rev. franç. de Pediat. **1**:657 (March) 1926.

In a full discussion accompanied by numerous illustrations, the author gives his reasons for believing that most congenital anomalies are dependent on a disproportion between the amnion and fetus. The relative shortening or narrowing of the amnion causes mechanical injury from direct pressure and nutritional injury from the interference with the blood supply through indirect pressure. According to the author, the disproportion may be a transitory affair, and the type of anomaly depends on the time in fetal life at which this occurs. The part or parts that are growing most rapidly at the time the disproportion occurs will suffer the greatest injury. The most striking conditions explained on this basis are mongolian idiocy and cranio-cleido-dysostosis.

LESLIE, Chicago.

DISCHONDROPLASIA. A. CANELLI, Clin. Pediat. **8**:513 (Sept.) 1926.

The author prefers the term dischondroplasia to achondroplasia because the latter, although more commonly used, does not correspond to the clinical or roentgenologic picture. A case is reported. The salient roentgenologic features were: Arrested growth of the bones in the upper and lower extremities. The disorder is preeminently epiphyseal. Periosteal ossification is not hindered. The epiphyseal zones appear excessively widened and blunted; the cartilaginous

portion is greater in extent and appears swollen and raised, producing a notable enlargement at the chondro-epiphyseal junction. The nuclei of ossification are for the most part absent. Those that are visible are poorly developed. In the areas in which the centers of ossification should be, one finds abnormal depositions of calcium. These areas do not show a trabecular structure. They are also seen in myxedema. There are no morphologic or developmental changes in the cartilages of the ear. Instead of a macrocrania and hyperbrachycephalia, there is a microcrania and a subbrachycephalia. The large fontanel is markedly enlarged.

ZAMBARANO, Northville, Mich.

A CASE OF INTRA-UTERINE TRANSMISSION OF RELAPSING FEVER. R. ADELHEIM, Jahrb. f. Kinderh. **114**:169, 1926.

Adelheim presents a detailed postmortem report of an intra-uterine acquired relapsing fever. The child was markedly icteric at birth and died on the seventh day. The icterus of the central parts of the brain "Kernicterus" was the chief reason for publication of the report. This condition is rare even in the most severe icterus, and the mechanism of its development is not well known. The author found in his case marked microscopic changes in the choroid plexus and in the ventricular ependyma. He believes that these changes are directly responsible for the "Kernicterus" rendering the structures described above more permeable to bile-pigments.

PARMELEE, Chicago.

FAT METABOLISM WITH ATRESIA OF THE COMMON BILE DUCT. ARVID WALLGREN, Acta Pædiat. **6**:123, 1926.

The literature is conflicting as to the ability to digest fat of infants with malformations of the bile duct. Some authors find that no fat is absorbed, and others find that more than 60 per cent of the fat intake is well handled. Wallgren's patient lived about four months. The metabolism was studied on three different occasions. It was found that when the child was in comparatively good condition and was gaining in weight, from 60 to 70 per cent of the fat intake was absorbed. When the child was in a bad condition and was losing weight, only 25 per cent of the fat was retained. An attack of indigestion exerted a bad influence on fat absorption.

The author concludes that it is not the lack of bile in the intestine that causes the fatal outcome in these infants, but rather the baneful effect of cholemia on the organism as a whole, thus influencing the digestion and nutrition of the infant indirectly rather than directly.

EIGHT CASES OF HEMIHYPERTROPHY. EJNAR LENSTRUP, Acta Pædiat. **6**:205, 1926.

The anomaly seems to be found with equal frequency in both sexes. It affects the right side a little more often than the left. All of Lenstrup's cases involved both upper and lower extremities. Next in frequency of involvement were the external genitalia, trunk, face, ear and tongue. The bones were involved in three of the eight cases. Several patients were followed from infancy through puberty — one was followed for nineteen years. The difference in size betweent the two sides of the body remained unaltered. The hypertrophied limbs exhibited poor coordination, although the muscles were highly developed. With the exception of one case, the glands of internal secretion were normal. Mentality was normal with a single exception.

An analogy is drawn between this disease and an anomaly observed in fishes in which the preganglionic sympathetic tracts do not cross. Damage to these tracts on one side will affect the development of only one side of the body. In this connection it is of interest that one of Lenstrup's cases was not congenital, but developed at the age of 2 years with the appearance of metastases from a malignant tumor.

HOLT, Baltimore.

Diseases of the New-Born

MENINGEAL HEMORRHAGE IN THE NEW-BORN. LEON VELASCO BLANCO and HUMBERTO PAPERINI, J. A. M. A. **87**:1261 (Oct. 16) 1926.

The authors have followed thirteen cases of meningeal hemorrhage in the new-born in which the survival was longer than twenty-four hours, and in six the recovery has been definite without sequelae. To these cases must be added nineteen still-born children, or those in which death occurred within twenty-four hours. In the total of forty-two cases, survival was longer than twenty-four hours in 31 per cent, and in 14 per cent the cure was complete. They conclude that even in the most desperate cases of meningeal hemorrhage, a cure is possible in a greater percentage than has been believed possible up to the present, provided an early diagnosis is made, followed by energetic treatment. Besides the obstetric history such symptoms as asphyxia, accompanied by dysphagia, bulging of the fontanel, convulsions, continuous moaning, stupor or coma and opisthotonos must be considered. As these symptoms are not pathognomonic, lumbar puncture is necessary for the diagnosis. In the majority of cases of meningeal hemorrhage, the treatment is exclusively medical and consists in decompression by spinal puncture, the hemostatic action of normal horse serum intraspinally and gelatin subcutaneously.

BONAR, Salt Lake City.

METHOD OF PROTECTING THE NEW-BORN FROM TETANUS. Rev. internat. de l'enf. **2**:1108, 1926.

Dr. Roux, director of the Pasteur Institute, Paris, has forwarded to the Academy of Science a communication from Nathan-Larrier, Ramon and Grasset announcing a method of protecting the new-born from tetanus. It is well recognized that up to the present there has not been any procedure evolved in medical practice to prevent the high mortality in neo-natal life from this grave infection. In some districts, particularly in the colonies, in which the population lives in close contact with domestic animals and in which infection from the soil is frequent, it is common to find a large death rate from tetanus neonatorum. Dirty scissors used to sever the cord, soiled hands and unclean dressings add to this indefensible slaughter of the innocents. The authors of this memoir have attempted to cope with the situation by injecting the mother before the birth of the child with tetanus antitoxin. They have found that ample protection is given the infant for a period sufficient to permit the umbilical wound to heal.

AMESSE, Denver.

LIVER FUNCTION IN INFANTS WITH SPECIAL REFERENCE TO ICTERUS NEONATORUM. C. W. HERLITZ, Acta Pædiat. **6**:214, 1926.

The author used the Rosenthal-White test — the excretion of bromsulphalein. No untoward effects were noted. It was found that infants over 4 months

of age could excrete the dye as well as normal adults. Between 1 and 4 months, 10 per cent of the dye could be recovered from the blood at the end of half an hour. During the first month of life, a more striking impairment of function was demonstrated. From 20 to 30 per cent of dye was present in the blood stream after half an hour.

No difference could be demonstrated between children with and without icterus of the new-born. Three older children with hemolytic icterus were found to excrete the dye normally.

If one grants that the test gives information as to the liver's capacity to excrete bile pigment, it follows that icterus of the new-born does not depend on inadequate liver function, for the liver function appears to remain constant during the time when jaundice normally appears and disappears. Support is thus given to the theory that jaundice of the new-born results from an increased load put on the liver during the early days of life by excessive destruction of red cells at that time.

The author's contention that the Rosenthal-White test is a measure of the function of the Kupffer cells alone does not seem to be supported by any experimental evidence.

HOLT, Baltimore

THE NATURE OF ICTERUS NEONATORUM. REMPEI KONDO, J. Pediat. (Tokyo), Dec. 20, 1926, p. 1745.

The author conducted an extensive and detailed research on the relation of various theories as to the causation of jaundice in new-born infants. His general conclusions, each of which is based on well-controlled experiments, are as follows: 1. The amount of bilirubin in the serum of the blood of the cord of the new-born infant is five times greater than that found in the postplacental blood and both show weak and indirect diazo reaction. 2. In the functional diseases experimentally produced in rabbits, there is always a production of bilirubin in the serum that agrees with the pathologic changes of the liver. 3. Concomitant with the increase of bilirubin in the experimental animals with disturbed function of the liver, there is an increase of serum lipase, which resists quinine. Thus, the liver function test based on the measurement of serum bilirubin and serum lipase is convenient and rational in the study of icterus in the new-born. 4. The serum lipase found in the blood of the cord and in postplacental blood as well as in the blood of the normal woman is somewhat similar in concentration, resisting quinine and atoxyl alike in the same degree, and therefore the function of the liver of the new-born is considered normal. 5. The liver function of new-born puppies is found also to be normal. 6. The fragility of the red cells in the new-born puppies with reference to the hypotonic salt solution is less or about the same soon after birth and rapidly increases in resisting power for a week or ten days and returns to normal at the end of the second week. The fragility with reference to saponin normalizes in about a week. 7. Intravenous injection of diluted bile brings about a high degree of resistance to fragility with reference to the hypotonic salt solution but variable with reference to saponin. 8. This result is more marked when the dilute solution of sodium taurocholate is injected intravenously. 9. The fragility is little affected by hypercholesteremia experimentally produced, and yet there is not any definite relation between it and the amount of serum cholesterin. 10. When the bile is eliminated from the blood by means of a biliary fistula in rabbits, the fragility is not affected

in the least. In other words, the bile, as it is unchanged, is not absorbed into the blood stream in normal conditions. 11. The fragility of the red cells, with reference to the hypotonic salt solution in the rabbits in which jaundice is produced by stagnation after ligation of the common biliary duct, is greatly lessened and with reference to saponin it is a little lessened. The serum bilirubin shows direct reaction. From the foregoing observations, the author believes that hyperbilirubinemia caused by changes of hemoglobin of the destroyed red cells in the new-born, which is partly effected in the reticulated endothelium and partly in the maternal placenta, is not sufficient to produce jaundice at the time or soon after the birth. It is only after the absorptive power of the gastro-intestinal tract, especially of the ileum, comes into function that the meconium-bilirubin, which is found already in the lining epithelium of the small intestine to the point of saturation, is absorbed into the blood stream. This, reinforced by the hyperbilirubinemia of the intra-uterine stage, is the true cause of icterus neonatorum. At the same time the power of the red cell to resist fragility becomes increased.

KATO, Los Angeles.

Acute Infections

DIPHTHERIA INFECTION OF THE MIDDLE EAR AND MASTOID. JAMES B. COSTEN, Arch. Otolaryng. **5**:119 (Feb.) 1927.

Two cases of diphtheritic infection of the middle ear and mastoid are reported. In each the infection was of long duration before its nature was recognized, and in each the mastoid structure was destroyed and replaced by a pyogenic membrane. This destruction was much worse than the symptoms seemed to indicate. The author comments that if pus from more mastoid and middle ear infections were cultured on special media it is possible that more cases of diphtheritic infection of these structures would be recognized.

BARNETT, Chicago.

MEASLES IN PRIVATE PRACTICE AS MODIFIED BY THE USE OF IMMUNE SERUM. R. G. FREEMAN and R. G. FREEMAN, JR., Arch. Pediat. **43**:563 (Sept.) 1926.

On analysis of the cases to determine on what day after exposure the best results may be obtained, it was found that in the total number of twenty-two patients, there were six without any measles and sixteen in whom a modified measles occurred. Of the eight patients injected the day after exposure, three did not have measles while five had a modified form. Of the patients injected on the second day after exposure, three developed measles, but the first two of these cases occurred so late that they were probably the result of subsequent exposure. One developed on the eighteenth day, one on the forty-first day and one on the fourteenth. Seven patients were injected on the third day after exposure; three did not develop any disease and four had modified measles. Patients injected later after exposure were protected in less degree and developed a severer form of the disease.

MARKED LEUKOCYTOSIS IN WHOOPING COUGH. A. G. MITCHELL and L. S. FRIEDMAN, Arch. Pediat. **43**:617, 1926.

The patient was a white boy, aged 4 months, with a temperature of 107.6. Bronchopneumonia was present. The blood showed a white count of 233,600, of which 48 per cent were neutrophils, 45 per cent lymphocytes, 3 per cent

large mononuclears and 2 per cent transitionals. The infant lived only five hours after admission; the temperature rose to 108, and a second white cell count shortly before death was 208,000.

SCARLET FEVER: A CLINICAL STUDY IN ITS PREVENTION AND SERUM TREATMENT. E. S. PLATOU and L. COLLINS, Arch. Pediat. **43**:707 (Nov.) 1926.

In this clinical study of scarlet fever toxin and antitoxin, Platou and Collins exhibit these facts: Small doses (3,000 skin test doses) of scarlet fever toxin (ricinoleated) did not protect eight nurses who were exposed to the disease from three to seven weeks after receiving the injection. Among individuals that were kept Dick negative by inoculation or reinoculation with the same preparation (Larson's toxin) in larger doses, no cases of scarlet fever have occurred, in spite of intimate exposure. Increasingly large initial doses may prevent the necessity of reinoculation to maintain immunity. The administration of a total of 9,000 skin test units of Larson's preparation has rendered a large percentage of children Dick negative for a period of twelve months.

The commercial preparations of scarlet fever antitoxin used in a comparative study of 190 cases were apparently specific. Acceleration in clinical improvement, as gaged by temperature, rash and symptoms, was quite definite in 100 receiving antitoxin, especially when the antitoxin was administered early. Better results might have been obtained if larger initial doses of antitoxin graded in units (according to blanching power per cubic centimeter) could have been used.

When given early, the serum has a beneficial effect on the toxemia and seems also to reduce the number of complications, although no effect on septic processes is noticeable. Small prophylactic doses given to five nurses in the group did not prevent later infection with scarlet fever. Serum sickness in one fourth of the cases was an annoying factor, and in eleven cases it was extremely discomforting to the patient, especially in those who had previously been sensitized to horse serum through diphtheria immunization.

VON MEYSENBUG, New Orleans.

SKIN TESTS IN MEASLES. RUTH TUNNICLIFF and RUTH E. TAYLOR, J. A. M. A. **87**:846 (Sept. 11) 1926.

The green producing diplococcus associated with measles produces an extracellular toxin which gives a definite specific skin reaction in persons with a negative history of measles, but not in those with a positive history. The toxin is neutralized by convalescent human measles serum and by the serum of goats immunized with measles diplococci, but not by normal goat serum.

These experiments indicate that antigens of killed measles diplococci (intracellular toxin) would be more effective for susceptibility tests than extracellular toxins on account of the former giving positive skin tests in about twice as many persons susceptible to measles as intracellular toxins (filtrate).

MEASLES PROPHYLAXIS; IMMUNE GOAT SERUM. ARCHIBALD L. HOYNE and BENJAMIN M. GASUL, J. A. M. A. **87**:1185 (Oct. 9) 1926.

Tunnicliff's immune measles serum has been, in the authors' experience, of definite value as a prophylactic for measles. If administered to contacts not later than the fifth day of exposure, always counting the date of onset as

the first day of the disease, protection is assured in about 90 per cent. Those who receive serum early, yet who are not wholly protected, pass through an attenuated form of the disease. Passive immunity endures from two to four weeks and in some instances even longer. One of the authors observed a child who was placed, through error, in a measles ward two weeks after he had received 7 cc. of immune goat serum intramuscularly. This child did not contract measles. The serum produced no deleterious effects, regardless of age or physical condition of the patients in whom it was used. The advantages of the Tunnicliff serum, as compared with the convalescent measles serum, are evident when the question of supply is considered. Ultimately, it is hoped, the Tunnicliff serum will be easily available for all who desire it, whereas a similar situation can scarcely be hoped for with convalescent serum.

THE PROGNOSIS OF TETANUS. ASTLEY P. C. ASHHURST, J. A. M. A. **87**:2089 (Dec. 18) 1926.

The author believes in the efficacy of intraspinal injections of tetanus antitoxin if given early. The patients who recover from tetanus without receiving antitoxin by this route are few; those who die of this treatment, if it is used promptly, are also few. All the antitoxin that is indicated should be given as nearly as possible at one time and as soon as possible after the diagnosis has been made. Intravenous injection of from 15,000 to 20,000 units of antitoxin and intraspinal injection of from 6,000 to 10,000 units should be given. That amount of antitoxin is enough to last eight days, and as a result few patients will require more. In twenty-three cases there were eight deaths including one death from pneumonia after apparent recovery from tetanus, a mortality of 34.2 per cent. If only those patients are counted in whom treatment was both early and efficient, there are eighteen cases with three deaths, a mortality of 16.6 per cent.

THE EPIDEMIOLOGY OF SCARLATINAL THROAT INFECTIONS SINE EXANTHEMATE. FRANKLIN A. STEVENS and A. R. DOCHEZ, J. A. M. A. **87**:2137 (Dec. 25) 1926.

During an epidemic of scarlet fever among the nursing staff of the Presbyterian Hospital in 1924 and 1925, there occurred several cases of pharyngitis from which *Streptococcus scarlatinae* was isolated. These scarlatinal infections of the throat, not accompanied by a rash, were similar clinically to concurrent infections of the throat caused by nontoxin producing strains of *Streptococcus pyogenes*, and occurred among persons who had shown negative skin reactions with scarlatinal toxin previous to their illness. Such persons were presumably immune to scarlatinal infection. In another series of cases studied, prophylactic doses of scarlatinal antitoxin administered to contacts not only prevented scarlet fever but had prevented these scarlatinal throat infections sine exanthemate. From these observations, it appeared that the immunity against *Streptococcus scarlatinae* was essentially antitoxic, and that antitoxin would prevent throat infection. Antitoxin in large amounts prevented both throat infection and rash. Just sufficient antitoxin might be present in the blood stream and cells of a person to prevent the rash, but not to prevent the infection of the throat and the growth of streptococcus. The authors conclude: that the same strain of *Streptococcus scarlatinae* may cause clinical scarlet fever or scarlatina sine exanthemate; that cases of scarlatinal angina are infectious; that scarlatinal anti-

toxin is an efficient therapeutic agent in scarlatinal throat infections without a rash, and that throat infections with *Streptococcus scarlatinae* may occur in persons who have previously had scarlet fever.

PREVENTION OF MEASLES BY IMMUNE GOAT SERUM. RUTH TUNNICLIFF and ARCHIBALD L. HOYNE, J. A. M. A. **87**:2139 (Dec. 25) 1926.

Goats have been immunized with green producing measles diplococci and their filtrates, and an antibacterial and antitoxic serum produced. From 4 to 6 cc. of immune goat serum was given to children 1 year old or older and to a few nurses, with a negative history of measles, after a definite exposure to measles. All persons who did not receive serum, and all who received serum five days or more after exposure, developed measles. Goat serum prevented measles in 45 per cent of persons who received serum on the fourth day after contact with measles patients, and in 97 per cent of those who received it within the first three days after exposure. All infants under 1 year of age who received serum after the fourth day after exposure developed measles. Ninety-eight per cent of infants given serum within the first four days after exposure failed to show any signs of the disease. Reactions to the goat serum were observed in 12 per cent of those injected. Although the duration of passive immunity with immune goat serum as with human convalescent measles serum is only a few weeks, the serum appears to be useful in preventing measles in young and sick children, and in stopping epidemics in institutions in which the inconvenience of an epidemic is great and the mortality may be high.

STREPTOCOCCUS VACCINE AS A PREVENTIVE MEASURE FOR SCARLET FEVER. D. V. NIKITIN, J. A. M. A. **87**:2143 (Dec. 25) 1926.

The author reports his experience with streptococcus vaccine and the results of a clinical study of postvaccinal sickness, which, in cases of strong reaction, may resemble a grave infectious disease. The postvaccinal sickness is similar to genuine scarlet fever. The inoculation of vaccine is harmless. Immunity after vaccination is acquired only after repeated inoculation (from two to three injections). Vaccination decreases the number of scarlet fever cases and is helpful in cutting down epidemics in settlements. Especial attention is to be paid to temperature and the state of the kidneys at inoculation. Of the 767 patients vaccinated, only eight, 1.05 per cent, fell ill, and all were in the group vaccinated only once. None of those who had been vaccinated two or three times caught the disease, though the larger number were from infected communities, and some of the vaccinated came in direct contact with the disease.

BONAR, Salt Lake City.

AN ANALYSIS OF ONE HUNDRED AND FIFTY DEATHS FROM DIPHTHERIA. BEVERLEY HANNAH and L. M. MURRAY, Canad. M. A. J. **17**:187, 1927.

This analysis was for the purpose of ascertaining the cause of the increase of mortality in diphtheria at the Riverdale Isolation Hospital, Toronto.

In 1922 the per cent of mortality was 5.9 while in 1925 it was 12.6.

Early diagnosis, early and sufficient administration of antitoxin and active immunization of all children, the author believes, will lower this mortality percentage.

THE TREATMENT AND CAUSES OF CONVULSIONS IN INFANTS AND CHILDREN. GORDON CHOWN, Canad. M. A. J. **17**:191, 1927.

Chown presents a review of present clinical knowledge of convulsions.

MOORE, Omaha.

THE DIAGNOSIS OF INFECTION BY THE MICROCOCCUS TETRAGENUS. R. DARDANI, Clin. Pediat. **8**:565 (Sept.) 1926.

The author reports a case of tetragenus infection in a child, aged 3 years. Following an attack of measles she developed a bilateral otitis media. Bronchopneumonia ensued and after ten days a diagnosis of purulent pleurisy was made. On exploratory puncture a small amount of serosanguinous fluid was obtained. *Micrococcus tetragenus* was isolated from the fluid. An intradermal injection of 50 million tetragenus cocci resulted in a papular erythemia at the site of injection. Thoracotomy was tried, but the patient died.

Tetragenus infection, because of its polymorphism in localization and manifestation, cannot be defined as a clinical entity. All ages are attacked and all organs in the body may be involved. At its onset the pharynx is most often the seat of infection. It has a tendency to follow a subacute course. Of negative value in diagnosis is the absence of intradermal reactions with ordinary micro-organisms. Blood culture is of great value.

THE AMATO BODIES IN SCARLET FEVER AND OTHER ACUTE INFECTIONS. F. ZIBORDI, Clin. pediat. **8**:698 (Nov.) 1926.

The bodies of *Amato* are small rounded, oval, elliptical or elongated masses found within the polymorphonuclear leukocytes. They stain with Azur II-Eosin. They contain one or more granules. The author studied twenty-one cases of scarlet fever, seven of diphtheria, five of measles and four of typhoid fever with reference to these bodies. He concludes that the bodies of *Amato*, although most frequently observed as leukocytic inclusions in the blood of patients having scarlet fever during the first few days of the disease, may also be found in cases of diphtheria, measles and typhoid fever. The bodies are morphologically dissimilar to the bodies of Döhle. In younger patients, these bodies are more numerous. They indicate cellular lesions of toxic-infective origin attacking prevalently the neutrophilic granulocytic system.

ZAMBARANO, Northville, Mich.

VACCINE THERAPY AND PROPHYLAXIS IN PERTUSSIS. O. PELLEGRINI, Pediatria **35**:71, 1927.

Pellegrini used stock vaccines of various kinds without any anaphylactic reactions, except an occasional slight rise of temperature and mild local reactions. A few patients having severe cases were given the ether treatment in addition to the vaccine. The latter was administered in 1 cc. doses, either subcutaneously or intramuscularly, daily or on alternate days.

Of eighty-one children treated with pertussis vaccine, forty-one were cured, twenty-three improved, fifteen were not improved and two died while under treatment. Expressed in percentage, 51.3 per cent were cured, 29.8 per cent improved and 19 per cent unimproved.

The author also administered vaccine in the same manner to eighteen children, with a definite history of exposure to the disease. Only two of these children developed pertussis, and then only a mild form, which subsided after three doses of vaccine in either case.

SALA, New York.

THE TREATMENT OF TYPHUS ABDOMINALIS WITH THE VACCINE OF CARONIA. ANDREAS TUDOS, Jahrb. f. Kinderh. **110**:24 (Sept.) 1925.

Tudos treated nineteen patients with a severe form of typhoid with the vaccine of Caronia. It is made by growing the typhoid organisms on agar. They are then washed off with physiologic sodium chloride solution. For emulsification the serum of a convalescent patient, which has a high agglutinin titer, is added. After thirty-six hours a similar serum from another patient is added. After the addition of 0.5 per cent phenol, the whole is centrifugalized to get rid of any living organisms. The whole is then warmed on three consecutive days at 55 C.

After several unsuccessful attempts with intramuscular injection, the vaccine was given intravenously, beginning with 0.5 cc. This was followed by chills lasting two or three hours. A rise in temperature begins after one hour, reaches its maximum in three or four hours, decreases in five or six hours, and in from twelve to eighteen hours the patients are fever free. In some cases a second injection after twenty-four or thirty-six hours was necessary because of a second rise in temperature. In all but two cases there was definite improvement with increase in leukocytosis and agglutinin titration.

EHRMANN, Chicago.

GENERALIZED VACCINIA FOLLOWING VACCINATION IN A CHILD WITH ECZEMA. RUNHILT VON DEN STEINEN, Jahrb. f. Kinderh. **114**:193, 1927.

A boy, aged 4½ years, who suffered for years with chronic eczema, slept in the same bed with his recently vaccinated brother. When he entered the clinic he had been seriously ill for seven days. The entire skin was covered with vesicles, the contents of which produced a typical vaccinia on the cornea of a rabbit. The child died three days after admission. Postmortem examination showed bronchopneumonia and the skin lesions. A sister, aged 8 months, without being vaccinated, also developed generalized vaccinia, but after three days of high fever the lesions disappeared. The author thinks that there was a hypersensitiveness present in this family. Many hundreds of other children vaccinated with the same vaccine did not show any unusual symptoms. The conclusion is not to vaccinate children with any type of eczema.

SEVERE EPIDEMIC OF GERMAN MEASLES. PHILIPP LEITNER, Jahrb. f. Kinderh. **114**:209, 1926.

The author had occasion to observe twenty cases of rubeola in his private practice in March and April, 1924. There were about forty more cases reported during the same period by other physicians in a city of 70,000 inhabitants. The unusual characteristic of the epidemic was that many of the children were seriously ill. He observed that the period of incubation was seventeen days, that measles will not render immunity for German measles and that rubeola may activate latent tuberculosis.

PARMELEE, Chicago.

INFLUENZA SEPSIS IN INFANCY. LEO BUCHHOLZ, Monatschr. f. Kinderh. **35**:31, 1927.

This paper is the clinical record of five cases of sepsis in infants with symptoms largely from the nervous system. Influenza bacilli were recovered from the blood. The disease is fatal in infants, though children more than 2 years of age may recover.

CONCERNING VACCINATIONS AGAINST VARICELLA. MEYER-STROMFELDT, Monatschr. f. Kinderh. **35**:111, 1927.

In an epidemic of chickenpox, the author tried vaccinating the uninfected children with contents of the vesicles. Other than an isolated pustule at the site of the inoculation, the children were protected from further symptoms of the disease.

GERSTLEY, Chicago.

THE DICK SKIN REACTION AS A TEST OF IMMUNITY TO SCARLET FEVER. E. NOBEL and H. OREL, Ztschr. f. Kinderh. **41**:294, 1926.

Nobel and Orel report more cases in which they have performed the test for immunity to scarlet fever by the Dick method and review the literature. Their results now agree with those previously reported by them. They have obtained 28.8 per cent positive and 71.2 per cent negative reactions consistently in 367 cases. The large number of negative tests is puzzling but it cannot be simply a reaction to a foreign protein, in that of sixty-two children who had a positive Pirquet test only three had a positive Dick test. The negative test in the opinion of the authors is not conclusive. Two children out of ninety-seven tested became ill with scarlet fever and of these, one had a positive reaction before the onset and also in convalescence. The other had a negative test before the onset and on the thirteenth day, but a positive test on the thirty-seventh day. In the orthopedic ward a patient with a negative test came down with scarlet fever.

These investigators are not willing to take the stand that hemolytic streptococci have no significant rôle in scarlet fever, but they do believe that the criteria set up by the Dicks, relative to the specificity of the reaction, are urgently in need of revision. The opinion of other foreign observers as to the Dick test is of interest. Jundell agrees with the authors that the reaction is specific, but that there are as yet unexplained factors. Kleinschmidt adopts a neutral attitude, since the test performed in a series of cases of measles was in a large number negative during the eruption and positive afterward. Benfey says the practical value of the tests is limited. Kundratitz is of the opinion that the test is not of great significance, reliability or specificity. Isabolinsky and Lipkin believe that the test is not specific, since 22.5 per cent of children who certainly had had scarlet fever reacted positively.

RESEARCHES ON THE DICK SKIN REACTION IN CHILDREN. HENRYKA FRENKEL and ANNA MARGOLIS, Ztschr. f. Kinderh. **41**:302, 1926.

The Dick test is to be regarded as specific. Up to the present, in the infected patients in the hospital cared for by the authors, only Dick positive children became ill with scarlet fever, and a Dick negative reaction occurred in almost all the patients who acquired scarlet fever. Five hundred and forty-two patients were tested, including forty-four adults, and there were 32.6 per cent positive reactions, which agrees with other investigators as does the observation that there is a rise of the positive reaction up to four or five years with a fall thereafter. It was found that the positive as well as the negative Dick reactions were of diagnostic help in doubtful cases. None of the children having negative reactions to the Dick test have come down with scarlet fever.

The figures for mothers and their infants agree with those of Zingher; that is, most of them show identical Dick reactions, and the immunity of the infants runs about five months. But there is no reason to assume that in infants nursed by foster mothers the Dick test can be influenced. It is not influenced by other acute or chronic diseases such as typhus, pneumonia and diphtheria, and there is no connection between the outcome of the Dick test and of the Schick test; 64 per cent were identical, and this agrees with Zingher.

Neither is there a connection between the Mantoux reaction and the Dick test. The observations of Nobel and Orel, that the pseudoreaction occurred only in children having a positive reaction to the Mantoux test was not confirmed. The pseudoreaction is definitely dependent on age, the quality of the toxin and peculiarities of the skin, such as site of injection or the presence of skin infections. The negative pseudoreaction — that is, a negative reaction — may occur in many cases in which the Dick test is definitely positive, and then it is to be regarded as positive. The results of tests repeated many times, from two to thirteen, in sixty-five children, show that a negative Dick test remains negative for weeks, months or years. No reaction has become negative when it was positive previously. With children giving a positive Dick reaction most of them remain positive, which does not bear out the observations of Bourcart that after from three to nine tests a positive reaction becomes negative.

According to Zoeller, in some individuals in whom there is insufficient antitoxin in the skin, there may result a negative test by local stimulation of the skin, which would explain alternating Dick plus and Dick negative results. The paradoxic pseudoreaction, control stronger than the test, is always to be regarded as negative. According to some American authors the extinction phenomenon and the Dick reaction are opposed; that is, the blanching phenomenon first occurs when the antitoxin content of the serum is sufficient to prevent a negative Dick test; but the authors found that a positive Shultz-Charlton test may be obtained with a Dick positive serum.

There are as yet unexplained factors in that the morbidity is from 15 to 25 per cent while the percentage of positive tests is 32 per cent, and the maximum of cases giving positive Dick reactions occurs at 5 years, while the maximum number of scarlet fever cases occurs in children of school age.

EMERSON, Boston.

THE SYMPTOMS ASSOCIATED WITH SCARLET FEVER IMMUNIZATION. GEORG JACOBSOHN, I. JUNDELL and NILS LÖNBERG, Acta Pædiat. **6**:250, 1926.

Two hundred and eighty-eight recruits were immunized with toxin made from *Streptococcus scarlatinae*. Three injections were given at intervals of one week, the dose being 100, 250, and 1,000 toxin units, respectively. About one half of the subjects were rendered negative to the Dick test by this treatment, but in spite of this several cases of scarlet fever developed among them.

Local reactions at the site of injection were found regularly, and in nearly one third of the cases general symptoms were noted. The most frequently observed were a rash, usually scarlatiniform in character, headache, fever, chill, malaise, and vomiting and occassionally sore throat. The reaction occurred as a rule within twenty-four hours of the injection. Urticaria was observed in several instances following the third injection.

HOLT, Baltimore.

Chronic Infections

EXCRETION OF MERCURY AFTER INTRAMUSCULAR INJECTION OF MERCURIC BROMIDE, INUNCTION AND RECTAL SUPPOSITORIES. H. N. COLE, JOHN A. GAMMEL, J. E. RAUSCHKOLB, NORA SCHREIBER and TORALD SOLLMANN, Arch. Dermat. & Syph. **14**:683 (Dec.) 1926.

The rate of excretion of mercury in the urine and feces was studied following intramuscular injection and administration by inunction. When mercury was given by injection daily, the maximum excretion was quickly reached and approximated only 16 per cent of the amount injected. With inunctions the excretion rose progressively with the continuance of the treatment, being less than with the injections at the end of the first week, equal at the end of the second week and twice as great at the end of the fourth week. Excretion reflects the actively circulating mercury rather than the stored mercury. Therefore, the injections are more prompt and the inunctions presumably more powerful. Excretion in the urine is greater than that in the feces. Absorption from rectal suppositories of emulsified mercury was insignificant.

PURPURA HEMORRHAGICA FOLLOWING SULPHARSPHENAMINE. FRANK C. COMBES, JR., Arch. Dermat. & Syph. **15**:194 (Feb.) 1927.

A tabetic man of 54 years, after treatment with sulpharsphenamine, developed a blood dyscrasia associated with purpura and leading to death. Necropsy was not performed.

JEANS, Iowa City.

A COMPARISON OF THE VALUE OF THE CUTANEOUS AND INTRACUTANEOUS TUBERCULIN REACTIONS. R. P. FORBES and B. GREEN, Arch. Pediat. **43**:736 (Nov.) 1926.

In a group of 131 institutional children a single application of the Pirquet test showed a positive reaction in 20, or 15.26 per cent. The intracutaneous test dosage of 0.01 mg. of O. T. did not detect any additional positives. The intracutaneous test dosage of 0.1 mg. O. T. elicited five more positive reactions, increasing the percentage by 6 per cent to 21.37 per cent. The intracutaneous test dosage of 1 mg. O. T. was too frequently followed by a local erythema reaction to be of value in diagnosis.

TUBERCULIN REACTIONS IN CONTACT AND NONCONTACT CHILDREN. B. GREEN and R. P. FORBES, Arch. Pediat. **44**:58, 1927.

Of forty-eight children having a definite history of family exposure to tuberculosis, 31, or 64.5 per cent, showed a positive tuberculin reaction. Of thirty-six children not having a history of family contact with tuberculosis, only seven, or 19.44 per cent, had positive reactions. There was not any definite relationship between either the incidence or the degree of malnutrition and tuberculous infection in this group. Both the Pirquet and Mantoux tests were employed in each child.

CALCIUM CONTENT IN THE BLOOD OF TUBERCULOUS CHILDREN. H. R. LITCHFIELD, Arch. Pediat. **44**:99, 1927.

There is a definite calcium deficiency in the blood of tuberculous patients. The far advanced cases showed the lowest calcium figures. While calcium is of value in the healing of tuberculosis, it does not have any decided therapeutic

value once the lesion is far advanced, as evidenced by the tertiary type, all terminating fatally, although there was a slight increase in the blood calcium after a few months' treatment with calcium chloride, iron and cod liver oil.

The increase in the blood calcium after five months' treatment in the primary and secondary cases showed that calcium is an important factor and should be employed as a specific.

VON MEYSENBUG, New Orleans.

TWO CASES OF LUPUS ERYTHEMATOSUS IN PATIENTS WITH CONGENITAL SYPHILIS; CURE BY SPECIFIC TREATMENT. HUDELO and RABUT, Bull. Soc. franç. de dermat. et syph. **33**:614, 1926.

In one case the eruption disappeared after three courses of neoarsphenamine, and in the other after bismuth injections.

PARKHURST, Toledo, O.

A STUDY ON THE ETIOLOGY OF PRIMARY TUBERCULOUS MENINGITIS IN THE CHILD. R. DEBRE and MLLE. CREMIEU-ALCAN, Rev. franç. de Pédiat. **2**:604, 1926.

In contrast to pulmonary tuberculosis and tuberculosis of the bones and joints, a prolonged intimate contact is not usual in the development of tuberculous meningitis. A study of the history in seventy cases showed that in only about one half of these was there any knowledge of exposure to tuberculosis, and in 64 per cent of these the duration of the contact was less than a year. The interval between the time of the contact and the development of symptoms was also relatively short. The study also showed that tuberculous meningitis occurs most frequently in the spring of the year.

LESLIE, Chicago.

LUPUS VULGARIS AND CONGENITAL SYPHILIS. G. VERROTTI, Arch. ital. di dermat. e siphil. **1**:522 (July) 1926.

According to the author, patients with hereditary syphilis show a marked predisposition to tuberculosis. In some cases the syphilitic skin lesions of these patients follow a peculiarly torpid course. In other cases there is a real mixed infection of tuberculosis and syphilis. In most cases there are syphilitic and tuberculous lesions or tuberculous lesions alone, each following its own course in the same patient.

PARDO-CASTELLO, Havana.

PERMANENT FILLING OF THE APPENDIX AS A SYMPTOM OF ABDOMINAL TUBERCULOSIS. P. FRICK, Monatschr. f. Kinderh. **35**:133, 1927.

The author reports a case of abdominal tuberculosis in a boy, aged 3 years. The roentgenograms showed the appendix to remain filled for many days. The author believes that this is a valuable diagnostic sign.

GERSTLEY, Chicago.

PROTECTION OF INFANTS AGAINST TUBERCULOSIS BY CALMETTE'S METHOD. H. SCHROETTER, Wien. klin. Wchnschr. **40**:151 (Feb. 3) 1927; concluded Feb. 10, p. 194.

Schroetter discusses at length the facts that are known today concerning Calmette's attenuated bovine tubercle bacillus culture (BCG) for the preventive inoculation of new-born infants. Since Calmette claims that by his method the mortality of infants from tuberculosis has been reduced from about 25 to 1 per cent, the procedure should be thoroughly investigated and, if found

valuable, adopted generally. Calmette has maintained that BCG is nonvirulent. However, Kraus, Tseknovitzer and Suarez have disproved this by demonstrating tuberculous lesions containing tubercle bacilli in animals injected with BCG. The lesions are temporary and harmless, and begin to retrogress in about three months. Schroetter suggests that BCG be designated as "nonnosogenic," rather than nonvirulent. Animal reinoculations have never resulted in the formation of a pathogenic strain from an original attenuated culture.

In the author's own experimentation, intravenous injections of BCG in several rabbits and guinea-pigs were negative, with one exception. In this case tubercles were subsequently found in the spleen. Inoculation of the cerebrospinal system by several routes gave negative results.

The protection conferred by BCG probably lasts only as long as there are immunity activities between the attenuated bacilli and the cells of the host. Calmette believes that protection continues well into the second year. The author thinks that it might be advisable to repeat the immunizing dose at the beginning of the second year of life. He is convinced that BCG is valuable and harmless. He recommends that Austria should investigate it further, on a wide scale, without delay.

OLMSTED, Seattle.

THE INFLUENCE OF SEASON ON THE INCREASE OF WEIGHT IN UNDERNOURISHED CHILDREN WITH TUBERCULOSIS. HERBERT OREL, Ztschr. f. Kinderh. **41**:409, 1926.

In an institution in which sixty cases of mild tuberculosis were treated in 1917 and 1921 to 1925, there was a great increase in weight in October and November and a relatively low one in June and July with a certain periodicity. The author agrees with Camerer that the seasonal change is caused by the increased water output in summer which is not covered by a sufficient intake and to the relative infrequency of disease in the autumn. There is a difference in the amount of energy used up and also in the appetite. It is apparent from these figures that with rational feeding even in the summer it is possible to obtain considerable gain in weight.

EMERSON, Boston.

I. THE TUBERCULIN REACTIONS OF PIRQUET, MORO AND MANTOUX. (A REPLY TO H. R. KROGSGAARD). ALEX. BRINCHMANN, Acta Pædiat. **6**:191, 1926.

II. THE TUBERCULIN REACTION OF PIRQUET, MORO AND MANTOUX. (A REPLY TO ALEX. BRINCHMANN). H. R. KROGSGAARD, Acta Pædiat. **6**:201, 1926.

These two articles form a polemic of some interest. Krogsgaard maintains that the best diagnostic procedure is a Pirquet or a Moro (percutaneous) test, followed by a Mantoux (intradermal) test, if a negative result is obtained in the first instance. Brinchmann believes that the ideal procedure is the injection of 0.1 mg. of tuberculin intradermally, followed by increasing doses if there is a negative result.

Both authors seem to feel that a source of error in repeated tuberculin tests is the sensitization of uninfected individuals by the first dose of tuberculin. Certainly this phenomenon must be extraordinarily rare, and it has not been encountered in this country except in instances in which an enormous dose of tuberculin has been administered.

Both authors seem to agree that the intradermal reaction with 0.1 mg. results in the identification of more cases of tuberculous infection than either

the Pirquet or the Moro reaction, and both admit that the intradermal test, necessitating the use of a syringe and a certain amount of technic, is slightly more troublesome. The chief bone of contention seems to be the supposed danger of increasing the dosage of tuberculin beyond the 0.1 mg. when a negative reaction has been obtained. The animal experiments reported by Brinchmann seem to confirm in a most satisfactory way the experience of others that in a definite number of instances one must give 1 mg. or more tuberculin intradermally to get a reaction, in a tuberculous individual. The alarm expressed by Krogsgaard at the thought of such a procedure does not seem to be supported by any evidence.

Internal Diseases

Blood Clotting Studies in Hemophilia. C. A. Mills, Am. J. Physiol. **76**:632, 1926.

In four hemophilic children there was a rich supply of thrombin in very fresh serum, but not any prothrombin which could be activated by cephalin. The thrombin disappeared rapidly, and was not replaced as in normal serum. The action of cephalin on recalcified citrate, plasma and its inability to act on hemophilic serum, led the author to conclude that the peculiarity of hemophilic blood lay in the prothrombin factor. Increased antithrombin was not found in these bloods. Normally reacting prothrombin appeared after protein sensitization, as well as after peptone injection.

H. E. Eggers.

A Case of Celiac Disease with Banana Treatment. Henry E. Irish, Arch. Pediat. **43**:533 (Aug.) 1926.

The general plan of treatment of the case reported was that of a diet high in protein and low in fat and carbohydrate, the latter largely in the form of raw banana.

The patient, a girl, aged 4 years, came under observation as an outpatient complaining of underweight and chronic diarrhea. The onset of the disease dated back to the time of weaning at 10 months. Cow's milk was first given in a bottle, and later at 14 months it was attempted to give it from the cup. This was refused and after several days of struggle, the bottle was again offered with the result that she refused the milk in any receptacle. After that time she subsisted wholly on potatoes, breads, butter and pie. It was not long before emaciation and diarrhea set in. At 4 years she weighed 19 pounds 7 ounces (8.8 Kg.).

The stools were typically those of celiac disease, being large, loose, fatty and foamy, and there were several a day. Mentally, the child was alert and bright. The dietary treatment outlined consisted of skimmed Bulgarian buttermilk, lean meat, fish, eggs, pot cheese, gelatin and nonstarchy vegetables. Gluten cookies were allowed. On the eleventh day bananas were given, starting with a half ounce daily of the ripe, mashed-through banana. This was rapidly increased to three whole bananas a day. The weight increased rapidly, with a few setbacks due to intercurrent infections, until at the end of a year's treatment she weighed 31 pounds (14.1 Kg.).

No explanation is forthcoming as to why banana sucrose is well tolerated while cane or beet sucrose is not. In this case the bananas were taken eagerly and did not interfere with the restoration of normal stool or general progress of the child.

THE CHEMISTRY OF ACIDOSIS. CARL A. KOCH, Arch. Pediat. **43**:571 (Sept.) 1926.

Our knowledge of the chemistry of acidosis, though at present hardly complete, is sufficient to place the treatment of it on a rational basis. The treatment of acidosis, like the treatment of any injurious process, has for its object the removal of the consequences and the cause or causes. Since the consequences of acidosis are the result of the immediate presence of acids, the most logical procedure would seem to be destruction of the offending substances, this being most easily accomplished by a process of neutralization. As the causes of acidosis are varied in number and nature and as only in a few cases is the acidosis the result of direct administration of acid, the removal of these causes will usually consist of the correct treatment of diseases, as nephritis, diabetes and pneumonia, or of conditions of shock and asphyxia in which acidosis may be either of minor or major importance.

PURULENT PERICARDITIS. ADOLPH G. DE SANCTIS, Arch. Pediat. **43**:726, 1926.

De Sanctis reports a case of bronchopneumonia in a girl, aged 3½ years, who had been sick two weeks prior to admission to the New York Post-Graduate Hospital. Three days after admission the temperature became normal and the child was much improved. Two days later there was a sudden rise in temperature to 104, the pulse became rapid (144), and respirations increased to 60. The lungs were normal to examination, but there was an increase in the heart area of dulness. The roentgen ray confirmed the diagnosis of pericardial effusion. A needle was inserted in the fifth intercostal space about 0.5 centimeter to the left of the sternum and was pointed upward and toward the right. Thick yellow pus was obtained. Resection of a rib or rather cartilage was done, and a drain inserted down to the pericardium but not into the sac. Elevated posture secured good drainage, and the child made a good recovery.

KETOSIS IN CHILDHOOD. REPORT OF EIGHT CASES. PHILIP COHEN, Arch. Pediat. **43**:763 (Dec.) 1926.

There are three types of ketosis in childhood classified according to their carbohydrate metabolism. The first type is the result of a depletion of carbohydrate reserves of the body by starvation, shows a hypoglycemia and is quickly relieved by relatively small amounts of carbohydrate. The second type is one in which the carbohydrate metabolism is abnormal. This type is always caused by infection and may be the result of either one of two causes, a temporary pancreatic insufficiency, or a lowered hepatic function. The apparently diabetic type is best treated by glucose and insulin, and the apparently hepatic type can be relieved by glucose alone, except in severe cases in which insulin seems indicated.

The third type is one in which the blood sugar is normal, the carbohydrate metabolism is normal, glycosuria is present and infection the cause. This type can be cured by glucose alone. The postulated mechanism is a deficient glycogenolysis or an excessive glyconogenesis. This type is treated with glucose alone, in spite of the glycosuria.

In all cases of ketosis, fluids should be forced and bicarbonate should not be given, but a buffer alkali may be used if an alkali is indicated.

DIABETES INSIPIDUS. REPORT OF CASE IN CHILD. M. L. BLATT and J. GREENGARD, Arch. Pediat. **43**:811, 1926.

A case of idiopathic diabetes insipidus with manifestation of pituitary dysfunction is reported. Hypodermic injection of the extract of the posterior

lobe of the pituitary (surgical pituitrin) in dosages of 1 cc. twice daily controlled the polyuria and polydypsia as long as it was continued. Other methods of administration of pituitrin were unsuccessful.

VON MEYSENBUG, New Orleans

CHRONIC NONSPECIFIC INFECTIONS OF THE LUNGS; THEIR BRONCHOSCOPIC AND ESOPHAGEAL PHASES. CHEVALIER JACKSON, J. A. M. A. **87**:729 (Sept. 4) 1926.

Observations on the etiology of chronic suppuration of the lung have led the author to believe that many of these cases are preventable. Particularly preventable are: stagnation of pus in acute and subacute suppuration; the overlooking of foreign bodies in the lung; the overlooking of foreign bodies in the esophagus, and the overlooking of complications of tonsillectomy. Bronchoscopic aspiration is a means of prevention of stagnation of pus in subacute suppuration and should be instituted when favorable progress ceases. Prompt bronchoscopic aspiration is the best means for prevention of chronic suppuration due to posttonsillectomic suppuration of the lung. Since chronic disease of the lung can be prevented in close to 100 per cent of the cases in which foreign bodies are aspirated, an early diagnosis is imperative. In chronic pulmonary abscess, bronchoscopic aspiration is indicated to prevent stagnation, and if used early would have been prophylactic. In cases of pulmonary abscess of other than foreign body origin and in which the pediatrician, the surgeon and the roentgenologist deem external drainage advisable, bronchoscopic drainage is not indicated. Many cases of chronic suppuration of the lung in children have resulted from mistaking the asthmatoid wheeze of foreign body for bronchial asthma. In bronchiectasis, early bronchoscopy is indicated. In every case of pulmonary suppuration, foreign body should be excluded.

CHRONIC NONSPECIFIC INFECTIONS OF THE LUNGS AND BRONCHI. JOHN LOVETT MORSE, J. A. M. A. **87**:736 (Sept. 4) 1926.

Chronic, nonspecific — that is, nontuberculous — infections of the lungs and bronchi are far more common in early life than is generally appreciated. Chronic bronchitis is usually the result of repeated attacks of acute bronchitis and is especially likely to develop in debilitated children. It is likely to be associated with acute exacerbations with asthmatic manifestations. Bronchiectasis of all varieties may develop in children. It seldom results from peribronchitis in chronic bronchitis, the most common cause being chronic interstitial pneumonia. In such cases, the process is limited to one lung and may be cylindric or sacculated, usually the latter. Bronchiectasis is seldom the result of tuberculosis of the lungs in early life. The condition should be suspected when, in the course of chronic bronchitis, the sputum is more abundant and more foul than is usually the case. It is difficult to distinguish between a large bronchiectasis and an abscess of the lung. The roentgen-ray is not of great assistance in distinguishing between chronic bronchitis and a general cylindric bronchiectasis unless the dilatation of the bronchi is greater than it usually is in early life. Chronic nonspecific bronchopneumonia practically never occurs in childhood, but in infancy it is probably somewhat more common. Subacute bronchopneumonia persisting for weeks, and sometimes for several months, does occur in infancy, although if it lasts more than a few weeks the chances are that it is tuberculous. Chronic interstitial pneumonia

is usually taken for tuberculosis, but the latter rarely develops after lobar pneumonia. In some cases bronchiectasis may develop. Abscess of the lung in early life is usually caused by inhalation of a foreign body and is therefore most often situated in the right lower lobe. It is almost never tuberculous in childhood. The roentgen ray is useful in locating abscesses deep in the lung. Bronchoscopy is often of assistance in the diagnosis. In interlobar empyema the physical signs are obscure, and in the diagnosis of this condition the roentgen-ray is of great value. It is evident that although these conditions are all uncommon, they can be recognized fairly readily from the history and by careful physical examination. The roentgen ray is not of much assistance in the diagnosis except in abscess of the lung and interlobar empyema and in the recognition of deep cavities. None of these conditions should be confused with pulmonary tuberculosis, if the differences between them and tuberculosis are kept in mind. Examination of the sputum and the tuberculin test are frequently of value in the diagnosis.

Infantile Kala Azar in Syria. Joseph K. Hitti, J. A. M. A. **87**:1302 (Oct. 16) 1926.

Kala azar has never been reported in Syria before. The disease is found in Syria and is being confused with malaria or Malta fever. Five cases, all in males, are reported. The last three patients were given antimony and potassium tartrate in the sinus of the dura without any serious effect.

Bonar, Salt Lake City.

Diabetes in a Child Three Years of Age. R. P. Smith, Canad. M. A. J. **17**:214, 1927.

The author presents the case history of a girl, aged 3 years, with moderately severe diabetes mellitus complicated with infection. Under treatment with insulin and dietetic measures, she became apparently normal within a year, although still taking from 2 to 8 units of insulin a day.

Moore, Omaha.

A Case of Polyarteritis Acuta Nodosa. John Gray, J. Path. & Bact. **29**:245, 1926.

A case of polyarteritis nodosa in a boy, aged 12, is reported. While sledging he had scratched his left knee and this was followed a week later by fever, swelling and pain. After an illness of nine weeks he died suddenly. Autopsy showed a large aneurysm (6 by 3½ by 3¼ cm.) of the cystic artery, which had ruptured. There were many small aneurysmal dilatations of the smaller arteries, especially of the intrahepatic branches of the hepatic artery and of the coronary arteries. The aorta, superior mesenteric and main part of the hepatic arteries were normal.

Histologically, all coats of the smaller arteries were affected. The vasa vasorum and the adventitia were prominent and dilated. There was a perivascular infiltration consisting of lymphocytes and polymorphonuclear leukocytes. The media showed patchy disappearance and thinning, with cellular infiltration and fatty degeneration. The elastic lamina was repeatedly interrupted. The intima showed mainly proliferative changes which often filled the lumen completely, at times forming small grayish nodules on the inner surface of the vessel.

Organisms were not found in the sections of the diseased vessels, but the onset and febrile course of the disease indicate an infectious process.

E. M. HALL.

ABDOMINAL LYMPHOSARCOMAS WITH METASTASES IN THE CRANIOFACIAL BONES; FALSE CHLOROMAS. VOLPE and BLOISE, Arch. de méd. d. enf. **30**:73, 1927.

Two cases of primary lymphosarcoma of the perirenal lymph glands in children are reported with exhaustive clinical data and complete postmortem observations. In each case there was extensive metastasis in the flat bones, especially those of the cranium and the face affording, in the latter instance, a typical picture of chloroma. In addition, there was an intense anemia, giving a greenish yellow tinge to the skin; the liver was enlarged and there was hyperplasia of all the accessible lymph nodes. Examination of the blood was negative for chloroma, and histologic examination following autopsy confirmed the clinical diagnosis of lymphosarcoma. The patients were boys, 3 and 4 years of age, respectively, each dying in the fourth month of invasion. The authors invite particular attention to the differential diagnosis in these cases and recommend not only careful study of the blood but examinations of the neoplastic pulp, the bone marrow and the spleen, obtained by puncture.

AMESSE, Denver.

IODINE IN THE TREATMENT OF DISEASES OF THE THYROID GLAND. DAVID MARINE, Medecine **6**:127 (Feb.) 1926.

The greatest value of iodine in diseases of the thyroid will always be in prevention. Simple goiter may be prevented by the administration of 1 mg. of iodine daily. Iodine in any form or administered in any way is effective. Warning is made against too large doses. Causing or aggravating exophthalmic goiter by the use of iodine is not associated with any noteworthy dangers if the foregoing dosage is used.

SANFORD, Chicago.

INFECTIOUS JAUNDICE. V. MIKULOWSKI, Rev. franç. de Pédiat. **1**:576 (Nov.) 1925.

From a review of the literature and a study of thirty-four cases of jaundice occurring in children in the fall of 1924, the authors feel that many cases, commonly considered as simple catarrhal jaundice, are in reality the manifestation of an infectious process, most probably with some organism of the paratyphoid group. The abrupt onset with fever, headache and gastro-intestinal symptoms several days preceding the jaundice, and a history of contact with an interval of about three weeks between the contact and the development of symptoms (an incubation period of the same length as that of typhoid) support this contention. The authors also agree with Eppinger that the cause of the jaundice is a destruction of the parenchyma of the liver rather than obstruction in the biliary passages.

PULMONARY INFECTION IN YOUNG CHILDREN. L. RIBADEAU-DUMAS, J. MEYER, J. DEBRAY and MLLE. TISSERAND, Rev. franç. de Pédiat. **2**:125 (June) 1926.

From a careful study of material obtained at autopsy, the authors conclude that infection plays a much more important part in the death of premature,

debilitated and young infants than is ordinarily supposed. Evidence of hematogenous infection in the lungs was found in many instances, even when there was no gross infection of the umbilicus. Aspiration pneumonia was also frequent. In infants who had showed recurring bronchopneumonias, an old focus of infection in the lungs was demonstrated at autopsy. The pulmonary edema, which has been described in athreptic infants, was thought to be a part of a characteristic change in the tissues rather than the result of hypostasis, as has been maintained by some authors. Most of the infants in this series had shown during life frequent vomiting and diarrhea regardless of the manner in which they had been fed, again illustrating the rôle played by infections in gastro-intestinal disturbances.

LESLIE, Chicago.

A CASE OF ALEUKEMIC MYELOSIS WITH THE CLINICAL PICTURE OF MIKULICZ' DISEASE. L. S. HANNEMA, Folia haemat. **32**:116, 1926.

In a boy, aged 7 years, the parents first noticed an increasing swelling of the left eyelid. Later the right eyelid became swollen in a similar manner. The salivary glands and several cervical nodes were enlarged. The spleen and liver in time became definitely palpable. The leukocytes ranged from 3,200 to 7,000, while hemoglobin and red blood cells decreased progressively, and just before death the hemoglobin was 20 per cent. The first examination of the smears showed 60 per cent polymorphonuclear neutrophils, 2 per cent myeloblasts, 1 per cent myelocytes, 2 per cent undefined and 35 per cent of lymphocyte-like forms which were classified as micromyeloblasts of the type first described by Naegeli. During successive examinations this type of cell increased markedly in number. The last smears showed 75 per cent of these forms with only 12 per cent neutrophils. A minority of the micromyeloblasts gave a positive oxydase reaction.

At necropsy, there was enlargement of the lymph nodes, spleen and liver. Several leukemic foci were noted in the kidneys. The lacrimal and salivary glands were diffusely and markedly enlarged, and the normal structure of these organs was completely obliterated by round cells slightly larger than lymphocytes, some of which gave a positive oxydase reaction. These were all thought to be myeloid in origin. The author points out that the case reported by Mikulicz presented simply enlarged lacrimal glands, and he also mentions that this and subsequent cases of the same type were all lymphatic aleukemias, while the present instance seems to have been definitely myelogenous. With these differences, he asks whether the case now reported is to be included as an instance of so-called Mikulicz' disease.

C. I. WATSON.

GENUINE NEPHROSIS AND IDIOPATHIC EDEMA. G. FANCONI, Jahrb. f. Kinderh. **110**:12 (Sept.) 1925.

Fanconi reports a case of nephrosis in a child, aged 2 years, with severe generalized edema which healed after drainage of an abdominal abscess containing pneumococcus; also a case of high grade idiopathic edema in a child, aged 2 years, who had a chronic colitis. In the latter case a one sided diet, rich in carbohydrate and free from salt finally caused the edema to disappear. The author discusses the possibility of an extrarenal genesis of the edema.

EHRMANN, Chicago.

A Case of Periarteritis Nodosa. Felix Basch, Monatschr. f. Kinderh. **35**:26, 1927.

Basch reports a case with autopsy. The clinical symptoms were a combination of polyneuritic, polymyositic, and a chlorotic marasmus. There was an intermittent fever of four months' duration as well as joint involvement. Death occurred from pulmonary and renal complications. The autopsy revealed diffuse changes in all the organs but especially marked in the kidneys.

Gerstley, Chicago.

A Case of Simmonds' Disease. K. Kurokawa, J. Pediat. (Tokyo), Dec. 20, 1926, p. 1815.

The author reports a case of Simmonds' disease, first described as an independent clinical entity by Simmonds, in 1914. The patient was a boy, aged 10 years, whose past history was not significant except illness with typhoid fever at 5 years of age. From this time on, the child had always been pale, with rough hair, and the growth in body weight and length had become stationary. Physical examination at time of admission revealed a tiny child, weighing 14.18 Kg.; he was 95.5 cm. tall. Subcutaneous fat was moderately present, but the skin was dry and pale. The head was of normal circumference, but the extremities were comparatively undeveloped. No edema was noted. Twenty teeth, ten on each jaw, were all of the temporary type, but no caries was noted. The thyroid gland was not enlarged. Moderate lymphadenopathy was noted. All laboratory observations were negative, but the roentgenogram of the bones showed the degree of ossification corresponding to that of a child, aged 4 or 5. The patient was put on thyroidin therapy but with no avail. Autopsy revealed practically all organs to be of normal appearance, and no pathologic changes were noted, except in the hypophysis, whose shape was almost spherical, 1.4 cm. wide, 1.5 cm. long, and 1.5 cm. in height. The surface was yellow and waxy, and lustrous. The surface made by sectioning was smooth and yellow-waxy in color. The two lobes were distinguished with difficulty. The hypophysis weighed 1.48 Gm., more than twice the average weight of the organ at this age. The dimension was more than four times the normal. Histologically, the organ did not resemble the normal tissue. The glandular cells were absent; some were definitely empty and others were degenerated, perhaps the remains of some cells.

Kato, Los Angeles.

Nervous Diseases

Influenza and Schizophrenia. An Analysis of Post-Influenzal Dementia Praecox as of 1918 and Five Years Later. Karl A. Menninger, Am. J. Psychiat. **5**:469 (April) 1926.

Of about 200 acute postinfluenzal psychoses at the Boston Psychopathic Hospital, one-third looked like and were labeled dementia praecox. Follow-up inquiries made from one to five years later reveal that of about fifty of these patients that could be traced two-thirds apparently had completely recovered, and certainly only ten who were living showed no improvement. This would seem to indicate the need of new diagnostic criteria or new prognostic conceptions for the acute schizophrenic syndrome. Many illustrative cases described at some length follow, so that the reader may judge for himself as to the nature of the material under discussion.

Read, Chicago.

CHOREA TREATED WITH INJECTIONS OF MILK. A. HYMANSON, Arch. Pediat. **43**:681 (Oct.) 1926.

Seven cases of chorea are reported, in which injections of milk were used at treatment. Of the seven, six were of the common type, the rheumatic chorea with endocarditis. The seventh patient showed an undetermined type and did not profit much by the treatment. The treatment consisted of intramuscular injections of 5 cc. of boiled milk at three day intervals. Reactions were slight, if they occurred at all and did not seem to have any bearing on the outcome. Since the average duration is given as from eleven to thirteen weeks and the author's patients were practically cured in half that time, he feels that this shortening of the disease is important.

VON MEYSENBUG, New Orleans.

NEUROPSYCHIATRIC ASPECTS OF CHOREA IN CHILDREN. FRANKLIN G. EBAUGH, J. A. M. A. **87**:1083 (Oct. 2) 1926.

The important and often serious neuropsychiatric aspects of chorea have not been adequately emphasized. In association with the sudden, irregular, purposeless, incoordinate movements are mental disturbances of an emotional nature of similar irregular type. In a group of thirty-two children with chorea, mental symptoms consisting of emotional lability and extreme fatigue were encountered with characteristic behavior disorders similar to those encountered in other organic conditions such as encephalitis and the posttraumatic group. Emotional lability constituted the most constant observation in this study. Previously quiet and manageable children became restless, irritable, extremely sensitive and abusive, and some became violent. Delinquency occurred in 21.2 per cent. The association of delinquency with chorea is a definite one, and the author feels that further investigation among a large group of delinquents would throw much light on this problem. The causal factors seem to point toward toxic and infectious agents. Following removal of the cause, choreiform twitchings may continue as a habit and should have treatment from a psychiatric standpoint. Hereditary influences were found to be marked in this series, and occurred in 43 per cent. Treatment consisted of rest, isolation, removal from school, efforts to instil self-confidence in the children, and avoidance of discussions and oversympathy by the parents.

INFANTILE TETANY. JOHN P. SCOTT and SAUL J. USHER, J. A. M. A. **87**:1904 (Dec. 4) 1926.

A study of twenty-one cases was made. The authors found that calcium chloride and ammonium chloride were specific in relieving the convulsion of tetany as long as they were given. In the main, there was an appreciable elevation of the blood calcium after giving either salt, but in two cases there was a definite lowering. Cod liver oil in large doses, when combined with calcium chloride, or by itself, slowly and permanently raised the blood calcium into the normal range. Ultraviolet ray treatment gave the most rapid restoration of the blood calcium to normal figures. Frequent treatment with the mercury vapor quartz lamp gave the quickest and most permanent results. Both the tetany and the accompanying rickets were cured. The ultraviolet rays raise the calcium concentration and also that of the inorganic phosphorus to normal by causing increased absorption of these elements from the gastrointestinal tract.

BONAR, Salt Lake City.

ABSCESS OF THE SPINAL CORD: REPORT OF A CASE WITH FUNCTIONAL RECOVERY AFTER OPERATION. HENRY W. WOLTMANN and ALFRED W. ADSON, Brain **49**:193 (June) 1926.

A girl, aged 11, in June, 1921, suddenly had chills and fever; the next day the legs were paralyzed and urination was impaired, but disturbance was not noticed in sensation. At the end of three months she could walk fairly well and soon entirely recovered. In May, 1923, the legs again gradually became weak and by September she was unable to walk; there was never any pain. Examination revealed a spastic paralysis, increased patellar and Achilles reflexes, and bilateral extensor plantar responses. Vibratory and postural sensibilities were absent in the legs; touch, pain, and temperature sensibilities were greatly impaired over the lower limbs and the peri-anal area up to the level of the eighth dorsal segment; control of the sphincters was considerably impaired. The spinal fluid was yellow, under low pressure and showed increased globulin. A diagnosis of meningomyelitis with spinal block was made, and an operation was performed. A greatly thickened dura was found, and incision along the posterior aspect of the cord allowed the pus from an encapsulated abscess to escape: the pus was verified microscopically. In two weeks there was return of movement and sensation, and two months later the patient walked without crutches. There was a slight relapse soon afterward with some impairment of sensation, but when seen again in September, 1925, the patient walked normally except for slight ataxia; sensation, reflexes and sphincter control were normal.

This is a remarkable case; of the twenty-nine cases of abscess of the cord reported in the literature, all but one were fatal. In the cases reviewed there was no particular age of incidence; as causes, diseases of the spine and lungs and bronchiectasis were the most common. The low incidence of abscess of the cord is attributed by most writers to: (1) the relatively small mass of the cord; (2) the small lumen and indirect course of the vessels entering the cord; (3) the protected location of the cord compared to that of the brain; (4) the presence of a protective agent, probably chemical (Schlesinger). The duration of the disease is from three days to seven months. In twenty-two cases the involvement of the cord was diffuse; there were multiple abscesses in three; abscess in the brain was associated in four. Meningitis was associated in at least fifteen cases. Owing to the diffuse involvement and the fulminant course flaccid paralysis was observed in at least one half of the cases.

The authors state that abscess of the cord is almost impossible to diagnose, and that meningomyelitis is the most usual conclusion reached. Since the lesions are usually diffuse, the cases are nearly all fatal; but the authors think that occasional patients with abscess of the cord may be saved by exploratory laminectomy and incision of the cord.

STACK, Milwaukee.

THE PROBLEM OF THE MONGOL. R. M. STEWART, Proc. Roy. Soc. Med. (Section of Psychiatry) **19**:11, 1926.

In mongolian idiocy the author finds the skull bones thin, the nasal bones very small or failing, the brain small and light and the gyri few and wide. The insula may not be covered by the operculum. The endocrines are normal; abnormal pigmentation in the central nervous system and inflammation are not present. The pyramidal cells are decreased and show an embryonic character, the myelin sheaths are thin, the tangential cortical fibers decreased, and the Purkinje cells often have two nuclei. The author concludes that mongolism is not due to syphilis.

ROY GRINKER.

CEREBRAL BIRTH INJURIES AND THEIR RESULTS. F. R. FORD, Medecine **5**:121 (May) 1926.

In a study of 280 cases of bilateral spastic paralysis, evidence is drawn that the congenital diplegias are not the result of meningeal hemorrhage at birth, but of intra-uterine origin. Four arguments support this: 1. In half of the cases meningeal hemorrhage is unilateral, and when bilateral is unequal on the two sides; cerebral diplegias are as a rule bilateral and symmetrical. 2. The heads of patients having diplegia are below normal size or are definitely microcephalic. Meningeal hemorrhage causes rapid enlargement of the head. 3. Children known to have intracranial bleeding at birth or in infancy to not develop cerebral diplegia. 4. The pathologic anatomy of true congenital diplegia is such that it cannot be reconciled with any theory of injury at birth.

The real injuries to the brain at birth are caused by the rarer intracerebral hemorrhages and necroses. The common diffuse meningeal hemorrhage which is not large enough to cause death apparently leaves no residue in the majority of cases.

The true cerebral birth palsies are represented by the congenital hemiplegias, the monoplegias, and the asymetrical and unequal bilateral spastic paralysis. In these cases the head is large or normal; a history of injury at birth may be obtained, and the pathologic anatomy is consistent with the hypothesis of gross injury at birth. These indicate that about 6 per cent of all infantile cerebral palsies are caused by injury at birth.

In epilepsies seen in children about 3 per cent are related to injuries at birth. Also severe grades of mental defect are probably not related to injury at birth.

OBSTETRICAL INJURIES OF THE SPINAL CORD. BRONSON CROTHERS and MARIAN C. PUTNAM, Medecine **6**:41 (Feb.) 1927.

With a review of the literature and a complete study and report of twenty-eight cases, covering six years, it is concluded that these injuries are caused by traction at delivery. The clinical evidence indicates that diffuse injury is common, and that any part or several parts of the nervous system may suffer. During six years the cases showing definite injury to the cord numbered twenty-six, the uncomplicated brachial palsies, 216, and the cerebral paralysis, 260.

These children fall into three groups. Some show flaccid paraplegias apparently due to almost complete destruction of the lower part of the cord. The second group exhibit lively reflexes dependent on the isolated part of the transected cord, while a third are handicapped by disturbances due to perverted control as a result of partial destruction of afferent or efferent tracts.

In treatment, conservative methods should be tried first, and definite operations involving destruction of the bone, muscle, or nerve should be used as little as possible. Physiotherapy can usually help contractures, and surgical treatment may be taken up later.

SANFORD, Chicago.

NEURO-ARTHRITIC CRISES VIEWED AS A CLINICAL ENTITY. M. MICHALOWICZ, Rev. franç. de Pédiat. **2**:631, 1927.

The attention of the author was directed to this group of cases by the sudden death of some of his patients, in whom aside from the general appearance of an intoxication, the only observations were slight vomiting and diarrhea. In all the cases one had the impression of being in the presence

of a profound nutritional disturbance, but the picture did not fit into any established classification. Other cases presented symptoms out of proportion to the local manifestations of a colitis or pharyngitis. Still others showed only an elevation of temperature combined with transient urticaria. The parents in all instances were of the extremely nervous or arthritic type. Intuitively, the author related these cases to the gout of the adult.

The uric acid content of the blood was determined in two of the patients with colitis, in one with urticaria, in one with a tendency to catarrh of the upper respiratory passages, and in four showing an exudative diathesis. In all instances there was an increase of from two to four times the alleged normal. No figures, however, were given for the normal determined under the same conditions.

The author concludes that a neuro-arthritic type exists that is characterized by an increase in the uric acid content of the blood. Children of this type are particularly susceptible to colitis, pharyngitis, tonsillitis, catarrh of the upper respiratory passages and various dermatoses, and in the face of these infections may develop general symptoms out of proportion to the local manifestations.

LESLIE, Chicago.

EPINEPHRINE TETANY. J. DUZAR and W. HENSCH, Jahrb. f. Kinderh. **114**:142, 1926.

The authors produced experimental tetany with hyperventilation and intravenous injection of 0.1 mg. epinephrine in intelligent healthy children, aged from 12 to 14. They found that the normally antitetanogenic effect of the epinephrine will be reversed if the blood reaction becomes alkaline through the hyperventilation. The clinical picture of the experimental tetany was typical with carpopedalspasm, general spasticity, tremor and characteristic changes of the electrical reaction.

Before and during the experiments, the pulse and the temperature were taken and the blood sugar curve determined. The effect of epinephrine on the blood pressure and blood sugar did not show any deviation from the usual. The hyperventilation without the use of epinephrine caused a fall in the blood sugar concentration.

Two children with latent tetany after the same experimental procedure showed unusually severe tetany. The increase in the tonus of the muscles was observed during the attacks. Duzar tried to utilize this fact therapeutically by treating patients having chorea — who are always hypotonic — with this method of hyperventilation and the administration of epinephrine. He observed favorable results in his seventeen cases, but in certain cases it was necessary to render the blood alkaline with large doses of sodium bicarbonate because hyperventilation could not be produced in these children. These therapeutic results were confirmed by Finkelstein and others.

PARMELEE, Chicago.

THERAPEUTIC TRIAL OF STRONTIUM SALTS IN TETANY OF NURSLINGS. REPORT OF TWO CASES OF TETANY UNASSOCIATED WITH RICKETS. OTTO TEZNER, Monatschr. f. Kinderh. **35**:37, 1927.

In doses of 2 or 3 Gm. of the chloride or 10 or 13 Gm. of the lactate daily, Tezner found that strontium had much the same effect as calcium in the tetany of nurslings. He then reports two cases of tetany in which there was no concomitant rickets.

GERSTLEY, Chicago.

ANTERIOR POLIOMYELITIS IN ITALY. R. SIMONINI, Clin. pediat. **8**:641 (Nov.) 1926.

This paper is a statistical study of 340 cases of anterior poliomyelitis occurring in fourteen Italian provinces during the past ten years. This is a supplement to earlier reports made in 1922 and 1924.

The author found that climatic and geographic conditions do not exert any particular influence on the occurrence of the disease. The majority of cases occur in the spring and fall. Males are more commonly affected than females. It attacks, especially, infants during the first and second year of life. Instances of second infection by the same virus were not found. Poliomyelitis was frequently associated with influenzal infections, encephalitis, cerebrospinal meningitis and herpes zoster. In some locations the disease was seen concurrently with malaria. It was less frequently observed in relation to whooping cough, measles, scarlet fever, rheumatic fever and epidemic parotitis. Gastrointestinal disorders were frequent in the symptomatology. Respiratory symptoms predominated, however. The paralysis involved the lower extremities more often than the upper. Several cases of the ascending type of paralysis (Landry) were observed. The so-called painful cases (polyneuritic) were common. A few cases of poliomyelitis without paralysis were reported. In the latter years, more atypical cases were reported, probably because of the increased knowledge of the disease.

SODIUM AND POTASSIUM CONTENT OF THE BLOOD IN TETANY PARATHYREOPRIVA. B. FOIS, Clin. pediat. **8**:688 (Nov.) 1926.

In parathyrodectomized animals the sodium and potassium content of the blood is increased and continues increasing constantly and progressively until death. It bears a strict relationship to the increase in tetanic phenomena.

ZAMBARANO, Northville, Mich.

A CASE OF POLYNEURITIS. JULIO DANERI, Arch. de Chilenos de Pediat. **3**:238, 1926.

A girl, aged 10 years, became wet and chilled and entered the hospital where a diagnosis of abdominal typhus was made. In one month she was discharged well. About a month later, she was returned to the hospital with a total paralysis of the legs and absence of the patellar reflexes. Pain and tactile sense were present only on the anterior surface of both thighs. There was no disturbance of the sphincters; the Babinski sign was present on both sides, and the cerebrospinal fluid was normal and the blood Wassermann reaction was negative.

She improved with injections of strychnine and cacodylate, but still walked with a tremor, two weeks later.

A noteworthy feature of this case is the presence of the Babinski sign, which made the diagnosis doubtful, but the author finds support in other reports of polyneuritis with the Babinski sign positive. This was the third attack of polyneuritis this child had; it had occurred at the age of 6 years following a chill, and had lasted two months; again at 9 years following a chill, lasting four months, and now in her tenth year following the infectious disease.

DWYER, Kansas City, Mo.

METABOLISM IN EPILEPSY. H. VOLLMER and J. SEREBRIJSKI, Ztschr. f. Kinderh. **41**:314, 1926.

The author admits that the conclusions to be drawn from a study of one case of epilepsy may hold only for this individual, but he reports it, believing that if other single cases were reported there might result possibly a grouping of epileptic cases that would be of importance. The boy here studied was 6 years old, had genuine epilepsy and defective intelligence, and was subject for months before admission to the hospital to frequent daily convulsions. Under dietetic and medical care, the attacks became less frequent and even were absent for days. It became possible, as the case was watched and was better understood, to provoke convulsions at will up to a certain degree or to prevent them. When food poor in chlorine was given, convulsions followed regularly the advent of an alkalosis, either spontaneous or caused by sodium bicarbonate or potassium acetate. The spells disappeared with the same regularity as soon as the total acid coefficient reached 10 (György's formula) or exceeded it, and thereby indicated an acidotic tendency; this tendency was favored most by a fasting acidosis, obviously because it coincides with an absolute chlorine starvation. Calcium lactate acts weakly in the direction of acidosis, but was always suitable to abolish an existing alkalosis. Its advantage lies in its freedom from chlorine. Calcium chloride, on the contrary, acts strongly in the acid direction, but because of its high chlorine content was not suitable in this case to protect against convulsions; for at the time when a generous addition of chlorine was made, only a high grade acidosis of a grade injurious to health was able to compensate for the ability of the chlorine ions to set up convulsions.

In food rich in chlorine, the significance of the acid base equilibrium as to the setting up of convulsions or suppressing them shifted and was secondary in importance to the chlorine ions. The albumin content of the food played manifestly a definite rôle only in so far as the addition of albumin means the coincident addition of chlorine. Dietetic prevention of attacks was guaranteed most certainly in this case, apart from fasting, by a diet of carbohydrate and fat, and food poor in chlorine. Pure sugar would be the most efficient food. If one avoids such a onesided diet with a low chlorine content — fruit, groats, etc. — it is advisable to give some drug which favors the diuresis of salts. Sodium bicarbonate and potassium acetate are contraindicated because of their tendency to favor alkalosis, but diuretin works well. The onset of convulsions was governed by the formula

$$\frac{\frac{A + NH_3}{N} \; 100 \text{ (urine)}}{\text{NaCl (blood)} \; . \; x}$$

when x is a multiple of one and expresses the fact that the blood chloride curve plays the principal rôle in the genesis of convulsions and that with a low denominator — that is, of the acid base equilibrium — is absolutely decisive as to the occurrence or nonoccurrence of paroxysms.

A COINCIDENT OCCURRENCE OF ACUTE RHEUMATIC FEVER AND CHOREA MINOR. KURT LEPEHNE, Ztschr. f. Kinderh. **41**:394, 1926.

In 1921, Pfaundler wrote that he had never seen a case in which both rheumatic fever and chorea minor occurred at the same time. Lepehne has found two such cases in the literature, and the author reports a third one here. A boy, aged 11 years, had pains in his feet and arms for three weeks with a mild fever, and at the time of examination showed a mild systolic murmur at

the apex. Under treatment with salicylic acid and sulphonated bitumen, N. F., the pains disappeared in five days but returned again in two weeks; this time they were accompanied by redness and swelling in the left foot and right wrist and with grimacing of the left side of the face and choreiform movements of the left upper and lower extremity. Rheumatic pains disappeared in two days with the use of cinchophen intravenously, and the boy was discharged in six weeks with some signs of a chorea still present. It was not a severe case and the chorea confined itself to the fingers, toes, elbow and knee joint, which were free from rheumatic fever. The case is interesting also because the grandmother had had chorea in her youth, and the mother's sister had had rheumatic fever and later on chorea. At the same time this patient was in the hospital, his sister, aged 8, became sick at home with rheumatic fever which led to mitral regurgitation. Eight weeks later there was the onset of chorea.

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Simultaneous St. Vitus Dance and Rheumatic Fever. M. Pfaundler, Ztschr. f. Kinderh. **41**:397, 1926.

Pfaundler says that at the peak of an intense and general rheumatic fever, a severe chorea is rare, and that if the two diseases are present, when the chorea has reached the severe grade, rheumatic fever becomes less intense. Roger says that nature desired to spare a child suffering from rheumatic fever the acute pain that a coexisting chorea would cause.

In the opinion of Pfaundler, there are two possibilities; 1. The effect of the toxin in one place in the body influences its effect in other places. 2. A chorea might be present but not evident because of a sort of pseudoparalysis due either to pain or to an unusual control of the extremity to avoid the feeling of pain. Roger believes that chorea attacks the limbs, as they are free from rheumatic fever. Pfaundler pointed out, however, that when frequent furuncles are present in chorea in consequence of an abnormal amount of movement, the condition of the skin increases the restlessness and it becomes worse.

Degenerative Pseudohypertrophy of the Pyramid. H. Baar, Ztschr. f. Kinderh. **41**:399, 1926.

A boy, aged 9, became ill with fever and showed signs of hemiplegia alternans facialis, later a paralysis of the hypoglossal nerve, and finally signs of bulbar involvement, disturbance of the sensorium and death. The sickness lasted four weeks, but he had had headaches for about one year. A focus near the pontile-medullary region on the right side was diagnosed as probably tuberculous in nature. Autopsy disclosed a considerable increase in size and a great discoloration of the right pyramid. Bronchopneumonia was the immediate cause of death. There was recent thrombosis of the pial vessels and of the superior longitudial sinus. Microscopically, the picture was that of demyelinization and glial proliferation in the pyramid. In the literature, that sort of localized sclerosis is rare, and only seven analyzed cases have been reported, none of which are in this locality but in the olivary body. Pierre Marie suspects the disease to be of inflammatory nature and probably connected with syphilis.

Emerson, Boston.

Heart Cramp in Spasmophilia. The Problem of Tone and the Question of Epilepsy. G. Peritz, Ztschr. f. d. ges. Neurol. u. Psychiat. **102**:395 (May) 1926.

Peritz maintains that some patients who complain of pain in the heart are looked on as neurasthenic or hysteric, but who in their venous curve show a

cramp-like state of the heart muscle. The majority of these are spasmophilic. Angiospasm is one of the chief symptoms of spasmophilia in adults, and angiospasm of the coronary vessels plays an important rôle in the origin of heart cramps. The removal of this angiospasm by caffeine or euphyllia alleviates the heart cramp. The mechanism of the condition is explained by the chemistry of muscle contraction, in which lactic acid is produced by anoxybiotic action, causing muscle contraction, and the removal of this substance by neutralization with acid and alkali leading to relaxation. If alkali is not brought to the muscle to neutralize the lactic acid, hypertonus results. The simplest explanation of this lies in the fact that the contraction of the vessels in the muscles prevents this neutralization. Peritz believes that the midbrain must be looked on as the regulatory apparatus in this condition, its removal from function causing hypertonus. The occurrence of heart cramps as an aura in epilepsy indicates that at the basis of epilepsy is a spasm of the cerebral vasculature. This angiospasm, however, need not be general, but may be confined to various regions, thus producing various types of attacks.

Peritz in recent years has come to look on cardiac cramps as an aura in epilepsy. Patients with such an aura have a uniform complaint: pain in the left breast, pressure and oppression in the chest, and often palpitation. In about ten cases of epilepsy such heart cramps occurred immediately before the attack. In intervals between the attacks, however, these cardiac symptoms have been prominent. The question of cardiac cramp has been investigated carefully. Treupel and Pletnen look on it as angina pectoris vasomotoria, and believe that vasomotor disturbances play a great rôle in the condition. Mackenzie looked on it also as angina vasomotoria and called it the X-disease. Investigation shows that patients who complain of this condition are, as Mackenzie said, thin, young and often lethargic-looking. They are pale; the hands are cold; they often complain of dyspepsia and often show dilatation of the stomach and collection of blood in the abdominal veins; usually, there is also slight dilatation of the heart with a little irregularity. Examination of the heart during these cramps does not show anything of note, but the venous pulse tracing, by the method of Ohm, shows definite cardiac hypertonus at such times. Peritz concludes from his studies, as stated above, that these are really cases of adult spasmophilia, in which angiospasm plays a great part. While the vessels often are palpable in this condition, thickening of the vessel walls does not occur, but merely a marked spasm of the vessels.

ALPERS, Philadelphia.

THE CALCIUM CONCENTRATION OF TISSUE FLUIDS WITH SPECIAL REFERENCE TO SPASMOPHILIA. N. MALMBERG, Acta Pædiat. **6**:241, 1926.

The author produced blisters in the skin by means of cantharidin, and compared the calcium concentration of the fluid from the vesicles with that of the blood serum. A close agreement was found—practically within the limits of experimental error. In normal children the calcium of the vesicle fluid was about 10 mg. per hundred cubic centimeters. In children with tetany, the calcium of the blister fluid was regularly below 8, and at times reached a value as low as 5 mg. per hundred cubic centimeters.

HOLT, Baltimore.

SPASMOPHILIA OF ADULTS. G. PERITZ, Medico-Biological Journal, Moscow **2**:1, 1926.

In the course of investigating what becomes of spasmophilic children, the author discovered and described a new constitutional group of individuals present-

ing a definite relation, both etiologically and symptomatically, to the tetanoid condition of childhood. This he terms spasmophilia of adults. He includes under this heading the asthenic, slender individuals who have long narrow chests and relaxed abdominal walls with enteroptosis, abnormally long extremities relative to the torso, pale skin and cyanotic, cold, moist hands. They present a great variety of symptoms including the various neuroses, migraine, epilepsy, angina pectoris vasomotoria, trigeminal neuralgia, sciatica, muscular atrophy, and even schizophrenia. The symptomatology of this array of conditions has for its common underlying cause an abnormal hyperexcitability of the peripheral nerves and of both the sympathetic and the vagus systems. The neuromuscular phenomena include unduly prompt and great response to electricity, Chvostek's sign, myoclonic contractions and hypertonus. Slight pressure over sensory nerves causes marked radiation of pain along distal distributions. The sympathetic overstimulation causes peripheral vasomotor angiospasm with good cardiac tone but with a normal or even subnormal blood pressure consequent on consistent dilatation of the vessels in the abdominal viscera. There is also an overactivity of the vagus system as evidenced by frequent occurrence of the Ashner reflex.

The condition resembles the vagatonia of Eppinger and Hess, from which it differs by the presence of sympathetic as well as vagus hyperexcitability. This conception is contrary to the pharmacologic bases on which the theory of Eppinger and Hess was founded. The author reconciles the difficulty by the belief that in the spasmophilia of adults the entire nervous system is in a state of hyperexcitability. This is dependent on endocrine unbalance, especially thyroid and parathyroid dysfunctions, which cause metabolic disturbance, more particularly an alkalosis and a potassium-calcium deficiency. The author treats these cases successfully with appropriate glandular products and calcium preparations.

YASKIN, Philadelphia.

Diseases of the Eye

INTRA-OCULAR SARCOMA IN CHILDREN. WALTER R. PARKER and WILLIAM H. STOKES, J. A. M. A. **87**:1891 (Dec. 4) 1926.

In the ten cases reported, fourteen eyes were affected clinically and eleven were made available for pathologic study. Both eyes were involved in four cases, and in one the second eye was enucleated after death. In eight, there was no history of an hereditary tendency. In two the history was unknown, although the patients were sisters, each having both eyes affected. In six cases, roentgen-ray therapy was given after exenteration. In three cases recurrence and death occurred; in two cases there was no recurrence, and in one case the result was unknown. In one case the remaining eye was treated with radium to no avail, and in another the rapidity of the growth has been checked by radium. Sarcomas of this nature are nonpigmented, rapid in growth and highly malignant, and have marked properties of angioblastic proliferation. Further study will be necessary to prove definitely the suggested possibility that a glioma or a neuro-epithelioma of the retina as a clinical entity in children does not exist.

BONAR, Salt Lake City.

A CASE OF HEMIHYPERTROPHIA FACIEI WITH HYDROPTHALMUS. HERMANN SÜSS, Ztschr. f. Kinderh. **41**:404, 1926.

A boy, aged 3 years, had been born with hypertrophy of the eye, which had been removed by operation at the age of 1½ years. There was also a

hypertrophy of one side of the face, which it is assumed occurred with the deformity of the eye before birth. The entire right side of the cheek and the right half of the upper lip were much increased in size and the upper lid was edematous. The alveolar processes were larger on the right than on the left in the upper jaw, and the teeth on that side were more developed and bigger than on the left upper jaw. Roentgen-ray examination showed the right orbit and the right upper jaw to be greater than on the left. The palate was dislocated downward. This is the only case thus far reported in the literature to show a combination like the one just described.

EMERSON, Boston.

Diseases of the Ear, Nose and Throat

TREATMENT OF DISEASED TONSILS BY MEANS OF RADIUM. J. COLEMAN SCAL, Arch. Otolaryng. **5**:109 (Feb.) 1927.

Lymphoid tissue is more sensitive to the action of radium than any other tissues; hence, radium can be used to cause an atrophy of the tonsils without injury to the surrounding structures. Three days after the treatment, the lymphoid cells show a swelling of the cell body and a hyperchromatism of the nuclei. Two or three weeks later the cytoplasm undergoes liquefaction, the cell membranes rupture, and the nuclei disintegrate. Inflammation follows with granulation and finally scar tissue results.

The first method consisted of six treatments of three hours at two or three week intervals, when radium needles were inserted into the tonsil. This was painful, and it was uncertain that a proper distribution of radiation would be obtained. With the second method three or four glass radon seeds of proper dosage were permanently implanted into each tonsil. This gave much better results and was practically painless but left foreign bodies permanently in the tonsil. The third method consists of implanting one platinum radon seed containing 2.85 millicures of radium emanation into each tonsil and removing it at the end of four days by a thread that is attached to it. This seems to be the ideal method and is an excellent procedure when tonsillectomies are indicated, and the surgical operation cannot be performed because of hemophilia and other surgical contraindications.

STUTTERING. JOHN A. GLASSBURG, Arch. Otolaryng. **5**:122 (Feb.) 1927.

It is estimated that about 1 per cent of all school children of the United States are stutterers. Stuttering is defined as difficult speech in which certain sounds, such as p, b, m, and w, are repeated. It "is a spastic coordination neurosis caused by mental conflict." Heredity is a predisposing factor and contributory causes are shock, nervous exhaustion and psychic insult.

There are three phases of treatment: first, the surgical, which is to correct anatomic and pathologic defects of the organs of speech. The second is psychotherapy. By psychanalysis the cause is found and often corrected; by distraction, such as the use of the metronome marking each syllable, singing and chanting the sentences, breath grouping, pacing and writing, the patient's attention is taken from himself, and by inspiring confidence in himself and his speech he is greatly helped. The third phase of treatment is reeducation. This consists of special exercises in muscle relaxation to break the spasm of the speech organs, correct breathing exercises, vocal gymnastics and training in phonetics.

Although stuttering is a difficult condition to cure, it can be done by persistence and the cooperation of the patient, his teacher, and his physician.

LYMPHOID TUMORS OF THE TONSIL. S. J. PEARLMAN and I. PILOT, Arch. Otolaryng. **5**:143 (Feb.) 1927.

A review of several cases of tumors of the tonsils was given, and four cases of the authors' were reported. The first was multiple and the others were single pedunculated tumors, arising either from the bottom or the wall of the crypts. The tumors consisted of a central strand of connective tissue surrounded by hyperplastic lymphoid tissue similar to the tonsil itself. These were thought to be an unusual formation of hyperplastic lymphoid tissue rather than true new growths of the tonsil.

BARNETT, Chicago.

THREE MILLION DEAFENED SCHOOL CHILDREN. EDMUND PRINCE FOWLER and HARVY FLETCHER, J. A. M. A. **87**:1877 (Dec. 4) 1926.

Recent surveys of the condition of the hearing of school children in the United States indicate that more than 3,000,000 have defects of hearing. It is suggested that each school should have permanently a quiet room for the examination of the eye, the ear, the nose and the throat. Each school should have access to a phonograph audiometer and a tone range audiometer or their equivalents. Special classes for lip reading should be provided in each school during school hours for the deafened child. Special schools should be provided for those having a great loss of hearing.

DIAGNOSTIC SCHOOL CLINIC IN PUBLIC SCHOOLS AS A FACTOR IN CONSERVATION OF HEARING. HORACE NEWHART, J. A. M. A. **87**:1882 (Dec. 4) 1926.

The diagnostic ear clinic in the public schools offers the greatest possibilities in successfully preventing unnecessary deafness. The fundamental step in its organization is a test of the acuity of hearing of all children on admission and should be repeated at least once every two years, preferably every year. Children found by the audiometer tests to have any material hearing loss are reported to the principal of the school. The parents are notified and a request made that the child be examined by a physician. The great objective is to find bodily conditions causing loss of hearing, and to correct such conditions in the speediest and most effective manner.

BONAR, Salt Lake City.

ADENOID VEGETATIONS IN NURSING CHILDREN. BALZANO, Pediatria **35**:87, 1927.

From a study of a number of infants in the first year of life, Balzano concludes that adenoid vegetations at this age are not rare. They may be the cause of grave troubles from otitis media to deaf mutism. He advises operation, which effectively prevents these troubles.

He examines the infants with a curved sound on which is placed a pledget of cotton. Rubbing the posterior wall of the fossa with this produces bleeding on the cotton, if adenoid vegetations are present.

SALA, New York.

LOCALIZATION AND DIAGNOSIS OF FOCI OF CHRONIC INFECTION IN CHRONIC TONSILLITIS. RUFF, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:157 (Nov.) 1926.

Acute tonsillitis extends in two forms, either superficially as a diffuse catarrhal or as a membranofibrinous inflammation, or from a primary defect

(ulcer) into the depth of the tonsil usually from the base of a crypt, resulting in phlegmonous tonsillitis or, if deep enough, in peritonsillar abscess.

The superficial catarrhal form may be followed by resolution and a normal condition may result; the fibromembranous form results in a subepithelial cicatrix. The ulcerative and phlegmonous forms heal with scar formation. In many cases the healing is not complete, but exudation and proliferation persist as evidence of a chronic irritation, associated with keratosis of the crypt epithelium and infiltration with leukocytes, lymphocytes and plasma cells. The clinical diagnosis of chronic tonsillitis is more difficult. Color, size and consistency are not conclusive; an irregular, torn surface, from the cavities of which abnormal exudate may be pressed, which shows a large preponderance of leukocytes, is of more value. The surest guide is a definite history of repeated attacks of angina. In a chronic inflammation the tendency to resolution is lost.

There are four sites of predilection for chronic inflammation: the upper tonsillar fossa, the lower tonsillar fossa, the supratonsillar fossa and infratonsillar (retroplicar) fossa. The upper tonsillar fossa is often divided from the lower (or sinus tonsillaris) by the plica transversus, which may also divide the tonsil into two distinct parts if two poles are present, or it may only partially divide the two poles. If only one pole is present, the plica transversus may be above or below it, depending on which pole has developed — the upper or the lower. The clinical history and pathologic conditions are given in detail in fifty-three cases, from which the conclusions given above are drawn.

[ARCH. OTOLARYNG.]

ANGINA AGRANULOCYTICA. BRUEGGEMANN, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:187 (Nov.) 1926.

That tonsillitis is a general disease, and that it is improbable that the tonsils are the port of entry of the infection, is generally accepted. Therefore, study of the blood picture has attracted more attention and has led to the recognition of agranulocytosis (Schulz) or angina agranulocytica (Friedemann) which run a severe course and result in the patient's death in a few days or weeks, from septicemia or septicopyemia.

The onset is usually sudden, with high fever and prostration and a fibrinous or gangrenous exudate on the tonsils spreading to the gums, tongue, larynx, genitalia and floor of the mouth, sometimes showing brawny edema. The disease is not characterized by hemorrhagic diathesis, icterus or noteworthy enlargement of the liver or the spleen. There is swelling of the intestinal glands. The characteristic feature is that the blood picture does not show a change in hemoglobin or red cells, but a low white count with the absence of granular neutrophils and eosinophils and a relative increase in monocytes (40 per cent) with irregular nuclei and about 60 per cent large lymphocytes. There is a great reduction of granular cells in the femur and spinal marrow. A few lymphoids are present, including azurophil granular elements and megakaryocytes and supporting cells. Blood cultures are sterile, and cultures from the nose and throat are not characteristic.

Some cases do not show such characteristics, and in some the condition occurs after other prolonged infections. The therapy is expectant. In making a differential diagnosis the following must be considered: In acute leukemia there is an increase in white cells; in aleukocythemic leukemia there is an increase in lymphoid cells, and splenic enlargement; amyelia is accompanied by anemia and hemorrhagic diathesis. The important differentiation is from

monocyte angina, which has a favorable prognosis but many symptoms in common with angina agranulocytica. Monocyte angina is accompanied by general adenitis and enlargement of the liver and spleen; the blood contains about 80 per cent of large mononuclears. The acute myeloblast leukemia with the aleukemic blood picture is accompanied by severe anemia and hemorrhagic diathesis, also a decrease in platelets. In aleukemia there is a decrease in red, white and platelet cells. The author discusses the question as to whether the condition is a specific infection, is due to the absence of some hormonal factor or is an autogenous or exogenous toxemia. (Animal experiments have shown that leukocytes may be destroyed by benzene.) The author recommends the study of the blood picture in all types of angina in order to learn something more about this disease, of which so few cases have been reported.

[ARCH. OTOLARYNG.]

SEPTUM HEMATOME AND ABSCESS. C. E. BENJAMINS, Geneesk. Gids **5**:25, 1927.

This is a report of five cases of hematomas and abscesses of the nasal septum, all of which occurred in children. These conditions often are misunderstood and may result in disagreeable consequences, as will appear from the following cases: The first occurred in a boy, aged 9 years, who fell on his nose; this caused a subperichondrial bleeding on both sides of the septum, infection and fluctuating swelling on both sides of the septum. Three weeks after the accident the boy came under medical attendance, but then the cartilago of the septum was already partly destroyed, which caused a remaining slight sinking down of the bridge of the nose.

The second case was observed in a boy, aged 12 years, who ten days after he came into the clinic appeared to have scarlet fever. The possibility of a relation between this case of abscess of the septum and scarlet fever is discussed.

In the case of septum hematomas the bleeding from the beginning may be either on one or on both sides of the septum. In all cases, however, swelling on both sides of the septum soon results. If these conditions are not treated in time by incision, squeezing out of the blood and tamponade, suppuration nearly always follows, and then there is a great risk that the cartilago will be partly destroyed, and in this way depression of the bridge of the nose may result.

The abscesses of the septum may be either secondary to a bleeding or primary from the beginning. In the last cases the principal causes of the abscesses of the septum are: (*a*) direct infection by small trauma caused by the nails; (*b*) conduction of a suppurating process from the neighborhood; (*c*) metastasis of infecting germs in general diseases. From *b* the author gives the report of a case in a girl of 5 years, who had an abscess of the nasal septum in connection with a furuncle of the upper lip. Also in this case recovery followed surgical treatment, but again with a depression of the bridge of the nose. To the type named under *c* belong abscesses of the nasal septum which ordinarily occur after a common cold, influenza, measles, pneumonia, scarlet fever, etc.

The diagnosis of the abscesses as well as of the hematomas is always simple. The swelling on both sides of the septum is of a weak, elastic consistency. Direct treatment is necessary and must consist of large incisions on both sides, followed by tamponade during some days to keep the incisions open. Two complications may occur, which are characteristic: extension of the

process to the surrounding tissues and deformity of the nose. The first complication may cause a severe general condition, and by the deformity of the nose the appearance of the patient is not beautified, as the author demonstrates in his fifth case.

S. Van Creveld, Amsterdam.

Diseases of the Skin

The Treatment of Erysipelas in Infants. M. P. Borovsky, Arch. Pediat. **44**:53, 1927.

The high mortality of erysipelas in infancy has prompted many investigators to seek more effective remedies in the treatment of this disease. Kerley gives the mortality as 95 per cent in the new-born. The therapeutic measures in common use are not only impractical in infants but are also mostly useless as well. Antistreptococcus serum has not been satisfactory in erysipelas because of lack of specificity.

At the Cook County Hospital in Chicago during the past eight months, a method of treatment has been instituted that seems to have reduced the mortality in infants to that of a small proportion of the previous figure. The treatment consists of painting the area involved, no matter how extensive, with 2 per cent mercurochrome-220 soluble twice daily. In addition, whole blood, from 15 to 20 cc., is given intramuscularly. Two or three days later another injection of blood is given.

Of the fourteen cases of erysipelas in infants under 1 year of age treated with this method, there were four deaths and ten recoveries. The author feels that in none of the fatal cases was the treatment given a fair trial. He admits that the treatment is purely empiric, but that it seems to be more satisfactory than any therapeutic measures previously used.

Von Meysenbug, New Orleans.

Hypoplasia (Aplasia) Pilorum Moniliformis. F. Parkes Weber, Proc. Roy. Soc. Med. **20**:95 (Dec.) 1926.

A boy, aged 3, presented characteristics of congenital hypoplasia pilorum moniliformis or intermittens (monilethrix, moniletrichia, "Spindelhaare," "beaded hair"), with moderate follicular keratosis of the scalp, being otherwise normally developed. There was not a family history of a similar condition. It was noted that the defective condition of the hairs of the eyelashes and eyebrows, which was also present, had not been associated with any obvious follicular keratosis (to the naked eye), and in this disease, the moniliform and defective condition of the scalp hairs, though usually associated with more or less follicular keratosis, seems not to be due entirely to the keratosis. The disease is probably allied to MacLeod's "ichthyosis follicularis," though MacLeod did not actually find moniliform hairs in his cases. Nor was the occurrence of moniliform hairs noted in Taenzer's cases of "Ulerythema ophryogenes," which MacLeod regards as possibly a severed form of his "ichthyosis follicularis," with progressive cicatricial changes.

Guy, Pittsburgh.

Pigmented Nevi Are Nerve Tumors. P. Masson, Ann. d'anat. path. **3**:417, 1926.

The histogenesis of these tumors has been the object of numerous investigations. Von Recklinghausen traced the origin of the nevus cells to the endothelium of the lymphatics and designated the tumors as lymphangiofibromas. Ribbert considered the nevus cell as mesodermal in origin, but "specialized" to

produce pigment. The connective tissue origin of the nevus cell is supported by Israel, Lubarsch and Jadasson. Finally, Unna claims that the nevus cell is epidermal in origin. The latter theory has been supported by Bloch, Darier and others.

Masson attempts to show that nevus is of nervous origin. The "neuronevus" of the scalp, according to Masson, arises from a localized proliferation of a group of elements of neurogenous origin, connected with the myelinic nerves of the derma. These elements are capable of differentiating in satellite elements typical of certain tactile terminations, particularly under the form of the corpuscles of Wagner-Meissner and the cells of Merkel-Ranvier.

A comparative study of the cells of Merkel-Ranvier and the epithelioid nevus cells on one hand, and the cells of Langerhans on the other, has impressed Masson with the idea that these elements, united by intermediary forms, are all functional adaptations of the same strain of cells. The cells of Langerhans or the epidermic melanoblasts in man are related to the tactile cells and the neuroglia of the tactile nerves.

In the second article Masson develops in detail his ideas concerning the relation of pigmented nevus of the scalp to nevus elsewhere. He affirms that there is not any distinction whatever between different forms of pigmented nevus. They all are terminal neuromas of the tactile nerves.

B. M. Fried.

Systematized Pigmentary Nevi of Radicular Distribution and Regressive Evolution. Louste, Ducourtioux and Lotte, Bull. Soc. franç. de dermat. et syph. **33**:634, 1926.

At the age of 6 months, elevations varying in size from that of a pinhead to that of a coin had appeared on the fingers, at first erythematous and later becoming brown. Each element attained its full development in six months, and disappeared after two years, gradually, not leaving any trace. As presented, the patient was 13 years old, and the hand and forearm were involved, in the area supplied by the sixth cervical to the first dorsal segments. As elements faded distally, new ones appeared more and more proximally. The histologic observations are described.

Cryotherapy in the Treatment of Angioma. G. Venturelli, Riforma med. **42**:1039 (Nov. 1) 1926.

The author reports several cases of angiomatous nevi of the face in children, which were cured by applications of carbon dioxide snow. He considers this method superior to all others in this condition.

Genital Chancriform Pyodermitis of the New-Born. J. S. Covisa and J. Bejarano, Rev. Dermat. Argentina **11**:45, 1925-1926.

The authors report three cases of a chancriform lesion of the prepuce in small children. The lesions closely resemble syphilitic chancres, but spirochetes are not present and local treatment is sufficient to effect a cure. In all cases there is a markedly large prepuce. They propose the foregoing name to designate this condition.

Metabolism and the Skin. E. Pulay, Arch. f. Verdauungskr. **39**:13 (Oct.) 1926.

From chemical analysis of the blood of patients with various dermatoses, Pulay affirms that there is a close connection between the electrolytes and

the pathologic condition of the skin. All of the eight cases of eczema presented a disturbance in electrolyte equilibrium. The deviations from the normal were not, however, always in the same direction. The total calcium was increased in three cases, decreased in two; the magnesium index was raised in three and lowered in three. Nine cases of urticaria were analyzed. Here, too, was seen a disturbance in the metabolism of calcium and magnesium, also in purine metabolism. There was hyperglycemia in 50 per cent of eight cases of psoriasis. The total calcium, determined in nine cases of psoriasis, was increased in two, decreased in three; magnesium was increased in four, diminished in two. In thirty-two cases of dermatoses, an antagonism between the total calcium and magnesium was observed in ten, between free calcium and magnesium in nineteen. The total calcium and potassium were determined in twenty-two cases; in four (in three of which both were normal) their behavior was similar, in four they presented antagonistic variations. Antagonism was shown in thirteen of nineteen cases examined for free calcium and potassium. Experiments in the therapeutic application of the results of these studies met with gratifying results.

[ARCH. DERMAT. & SYPH.]

A REVIEW OF THE LITERATURE ON SKIN DISEASES AND INFECTIONS DURING 1925. CARL LEINER, Monatschr. f. Kinderh. **35**:1, 1927.

This paper contains a complete review of the literature by one thoroughly conversant with his subject. Unfortunately, nothing much has appeared during the year which will make this obscure specialty any more comprehensible to the struggling pediatrician.

GERSTLEY, Chicago.

NEW CONTRIBUTIONS TO THE STUDY OF BLUE BIRTH SPOTS (MONGOL SPOTS). MAX ZARFL, Ztschr. f. Kinderh. **41**:356, 1926.

In the last five years, Zarfl has seen eleven children (ten of them infants) with blue spots, in addition to the twenty cases he reported in 1921. Seven cases showed the characteristic picture of circumscribed spots on the loins and buttocks, and three showed a picture hitherto undescribed in European children; that is, a diffuse, almost uniform bluish discoloration of the skin of the loins and buttocks. In addition, one child showed scattered areas of pigmentation of the lumbar region, while in another the whole back up to the shoulder blades was involved. This infant was observed until the spots disappeared, about one and one-half years, which has never been reported before.

A girl, aged 4 years, in whom the pigmentation of the corium extended to almost the whole trunk, is especially remarkable. With this case there were associated several malformations, angiomas of great extent, one-sided hydropthalmus congenita (secondary to malformation in the choroid, like angiomas in the corium?) and inequality of the lower extremities in size and length. The three deformities, it is to be noticed, involve tissues that have a common origin in the mesoderm, and for this reason, indeed, the pigmentation may be looked on here as a malformation.

A pigmentation of the corium of this extent and form has never been described in man, even in the Japanese literature on this subject, which extends back a hundred years, although a boy is reported who had more than forty spots. Microscopic examination of the discolored skin showed the same appearance as that of mongol spots. It can be likened only to the diffuse pigmentation that Toldt has described in some species of monkeys and may be looked on as

evidence that our forefathers possessed a similar specific discoloration of the skin. From this to the spots is simply a transition.

These cases induce us to believe that mongol spots are, in general, atavistic appearances, the occurrence of which in the white race is due to racial intermingling.

EMERSON, Boston.

DERMATITIS HERPETIFORMIS (DUHRING) IN CHILDREN. PROF. V. JOUKOVSKY. Reprint of a report made at the meeting of the Society of Naturalists and Physicians in Smolensk, Russia.

Professor Joukovsky, after a brief review of the literature, discusses a case of dermatitis herpetiformis (Duhring) in a child, aged 5 years, in which streptococci were repeatedly obtained from the vesicles. Treatment with autogenous vaccine resulted in a cure after three months. As smallpox had been suggested as a possible diagnosis, the child was revaccinated shortly after she was first seen. The result was a normal take, the two processes developing apparently uninfluenced by each other.

LESLIE, Chicago.

Surgery and Orthopedics

FLATFOOT IN CHILDREN. M. B. BRAHDY, Arch. Pediat. **44**:86, 1927.

The prevalence of flatfoot in children is not generally realized by pediatricians. The incidence at the author's clinic is 19 per cent of the children of preschool age reporting for routine examination.

The important contributing causes of flatfoot in children are: muscle weakness; improper footwear; excessive weight; systemic diseases; trauma; developmental defects and congenital anomalies.

The diagnosis is easily made by inspection and by making imprints of the patient's feet, which serves in determining if the shoes are too short and in noting the progress of the case. Treatment consists mainly of simple corrective exercises, education in walking, proper footwear and care of any associated abnormalities. All cases show either marked improvement or cure in one year.

VON MEYSENBUG, New Orleans.

THE SURGICAL TREATMENT OF PULMONARY SUPPURATION IN CHILDREN. EVARTS GRAHAM, J. A. M. A. **87**:807 (Sept. 11) 1926.

There is no particular treatment of pulmonary suppuration that will be equally satisfactory in all cases. Each case should be judged by itself, and the best results will be obtained if such cases are studied by a team consisting of an experienced medical man, a surgeon and a skilled bronchoscopist. In acute pulmonary abscess in children, the frequency of aspiration of foreign bodies into the lung makes it imperative to search carefully in every case for such a possibility. Location of the suppuration and determination of cavities by ordinary physical and roentgen-ray examinations are often unsatisfactory. The bronchoscope, in the hands of an expert, will often reveal this information positively, and the newer method of using iodized oil 40 per cent will undoubtedly prove of enormous value. The aspirating needle should not be used in cases of suspected pulmonary suppuration because of the danger of creating an empyema from leakage of pus along the needle track. Of forty cases of pulmonary suppuration in children under 12 years of age, thirty-three, or 82.5 per cent, are free from cough and other symptoms. The mortality has been 12.3 per cent.

BONAR, Salt Lake City.

THE THYMUS CONSIDERED WITH REFERENCE TO THE ADVISABILITY OF ITS ROUTINE X-RAY IN PEDIATRIC SURGERY. GAYLORD W. GRAVES and CHARLES WINFIELD PERKINS, M. Clin. N. Amer. **10**:885 (Jan.) 1927.

In a study of 700 roentgenograms from children between 1 and 7 years of age, about 8.6 per cent showed shadows suggestive of thymic enlargement, and about 4.2 per cent showed a considerable increase. Three conditions are to be differentiated: thymic enlargement without involvement of the general lymphatic system; status lymphaticus without thymic enlargement, and status thymico-lymphaticus. Any case showing thymic enlargement, even though symptoms are absent, should arouse surgical caution. While this condition may be present in marked degree without clinical symptoms, nevertheless sudden death, susceptibility to infection and psychic instability are characteristically observed in thymic subjects. Likewise, sudden death with lymphatism demonstrable only at autopsy may occur without previous warning.

The authors urge routine roentgen-ray examination of the thymus preliminary to surgical procedures in early childhood as a reasonable measure of safety. In cases showing suspicious shadows, operation should be deferred if possible until suitable treatment has been given. Commenting on the difficulties of universal prophylactic roentgen ray of the thymus in pediatric surgery, they observe that it has always followed that when something could be proved desirable in medicine for the better protection of the patient, such an advance would be demanded and eventually would become routine.

SMITH, Ogden, Utah.

HEPATIC ABSCESS IN INFANTS. T. ERCILE, Clin. pediat. **8**:547 (Sept.) 1926.

The majority of abscesses of the liver arise from the gastro-enteric tract. It is a rare condition in infants. The pathologic conditions giving rise to abscess formation in the liver are: traumatism, angiocholitis, infestation with lumbricoides, hydatid cysts, pyelophlebitis, appendicitis, dysentery, typhoid fever, tuberculosis, pyemia and influenza.

The modes of infection are: direct penetration, contiguity, through the biliary tract, through the portal vein, through the hepatic artery and vein and through the umbilical vein. In the majority of cases the infectious material passes through the portal vein.

In infants the diagnosis is difficult. The onset is usually sudden, and the child appears acutely ill. The skin is dark and occasionally icteric. The right lobe is most often the seat of localization. If the abscess is situated on the convex surface of the liver, the diagnosis is much easier. There is an enlargement of the liver, but this feature is not pathognomonic.

Roentgen-ray studies may reveal an elevation or deformity of the diaphragm. Leukocytosis is inconstant. If intestinal parasites are present, there may be an eosinophilia. Diagnostic puncture of the liver is dangerous and rarely of value. An exploratory laparotomy will not only settle the diagnosis but will also serve as a method of treatment. Examination of the feces is of great value when helminthiasis is the cause. The prognosis depends on the number of abscesses present and the time and mode of surgical treatment. Early intervention gives best results.

ACUTE OSTEOMYELITIS OF THE JAW BONES. P. GALLI, Clin. pediat. **8**:604 (Oct.) 1926.

The author reports a case of *B. coli* septicemia with primary localization in the intestinal tract in a child, aged 4 years. There was later localization

in the liver and kidneys. The illness pursued a tempestuous course for four weeks, when signs of an osteomyelitis involving the maxilla and mandible became evident. This the author believed to be of hematogenous origin and not due to external infection. The child recovered.

ZAMBARANO, Northville, Mich.

CONTRIBUTION TO THE STUDY OF THE TREATMENT OF SPINA BIFIDA. JOSÉ GONZALES MENESES, Arch. españ. de pediat. **11**:5, 1927.

The author believes that in the production of spinal bifida a primary early fetal lesion of the central nervous system is a factor. This lesion manifests itself principally in the choroid plexus and the ependyma. He believes that these lesions are generally syphilitic in nature and bases his conclusions on the high percentage of positive Wassermann reactions or actual syphilitic lesions found in his cases. These lesions are responsible for the varying degrees of hydrocephalus and are also a factor in the high operative mortality.

The author advises active antisyphilitic treatment in all cases giving any evidence of syphilis or a positive Wassermann reaction. This treatment should be carried out several months before any operative procedure is attempted.

SCHLUTZ, Minneapolis.

Miscellaneous

PEDIATRICS IN A MATERNITY HOSPITAL, WITH ESPECIAL REFERENCE TO NURSING ROUTINE. WALTER LESTER CARR, Arch. Pediat. **43**:585 (Sept.) 1926.

A comparison of the three and four-hour nursing intervals showed the following: At the end of fourteen days, infants nursed every three hours lead in gain in weight by approximately 2 ounces. In one month, infants nursed every three hours lead in gain in weight by about 8 oz. The initial weight at birth of the infants nursed every three hours was 7 pounds 2½ ounces (3,246 Gm.) compared to 8 pounds 3¼ ounces (3,710.8 Gm.) of infants nursed every four hours. The engorgement of the breast and irritation of the nipples were less noticeable when the infants were nursed every four hours. The comfort of both the infants and the mothers was superior in the four hour series, and this was recorded especially by the nursing staff. Jaundice occurred more in the infants nursed every three hours. The actual gain in weight at the end of one month in infants nursed once in four hours was 1 pound 3 ounces (538 Gm.) as compared with a gain of 1 pound 11 ounces (765 Gm.) for the three hour infants. At the end of six months the average weight of the four hour group was 17 pounds 3½ ounces (7,810 Gm.) while for the three hour group the average weight was 16 pounds 3 ounces (7,348 Gm.) so that these infants gained the same amount, 9 pounds (4,082 Gm.) during six months, although the three hour period was used for infants who were a pound lighter than those fed every four hours.

EMERGENCIES IN PEDIATRIC PRACTICE. RALPH M. TYSON, Arch. Pediat. **43**:592 (Sept.) 1926.

The emergencies that occur in a pediatrician's practice may occur in the general practitioner's practice.

In the treatment of spontaneous hemorrhage of the new-born, the essential factor is the giving of human blood at the earliest possible time. There is a form of acute nephritis that may cause death in twenty-four hours in a young

infant. Avoidance of acute infectious diseases and prompt application of heat to help restore kidney function are the important factors. In the infant, influenza may be the cause of death by oxygen starvation, toxic absorption from the upper respiratory tract or by pneumonia. Prevention of acute infectious diseases and prompt treatment of the condition when present are important factors. In non-diphtheritic septic sore throat, probably caused by the streptococcus, diphtheria antitoxin in moderate sized doses is almost a specific when given in the first few days of the illness.

THE USE OF AUTOGENOUS VACCINE IN THE TREATMENT OF SOME INFECTIONS OF CHILDHOOD. LEON VELASCO BLANCO, Arch. Pediat. **43**:697 (Nov.) 1926.

Four cases of pneumococcus empyema and nine cases of pyelocystitis in which treatment was with autogenous vaccine form the basis of this report. The experience recorded was so favorable in each instance that the conclusion is that it is a form of treatment that should be tried in every case, particularly in the severe acute cases and in the chronic types. No ill consequences followed the use of the vaccine.

VON MEYSENBUG, New Orleans.

BREAST FEEDING DEMONSTRATION AND PHYSICIAN. FRANK HOWARD RICHARDSON, J. A. M. A. **87**:977 (Dec. 11) 1926.

When the results of a breast feeding demonstration based on the three cardinal points laid down by Sedgwick are evaluated, it has been found usually that they fall short of what thoughful workers had hoped they might be. It is easy enough to get brilliant figures for the period actually covered by the mechanism of the demonstration, but such a piece of work must be judged, not by the figures of the year in which it is actually in operation, but by the results obtained year after year, when active demonstration is a thing of the past. The object of this paper is to record this fact, to report progress toward remedying it, and to outline a plan that it is hoped will be the solution of the difficulty. A rule is made that no mother was to be seen by any visiting nurse until the consent of the physician who had signed the birth certificate had been obtained. Another is to the effect that in no place will the state department of health consider lending aid through its district state health organization unless the request for such services is formally passed by the county medical society. One more step is to bring to the members of the local medical profession the whole message of breast feeding, as a part of the graduate education movement that is spreading over the whole country.

THE EFFECT OF ULTRAVIOLET IRRADIATION ON THE HEALTH OF A GROUP OF INFANTS. LOUIS H. BARENBERG, IRVING FRIEDMAN and DAVID GREEN, J. A. M. A. **87**:1114 (Oct. 2) 1926.

Irradiation of infants with the mercury vapor lamp was found to be associated with an initial increase in weight, which did not continue during subsequent months. Irradiation did not lessen the number of infections during the winter. During the spring, however, there was a definite decrease in infection. Ultraviolet rays did not protect against or mitigate pertussis. The hemoglobin was not increased by irradiation, but its percentage rose with the advent of spring and the diminution of infections. Irradiation improved the texture of the skin and the turgor of the muscles. The pigmentation brought about by the mercury vapor lamp differed somewhat from that which followed heliotherapy.

BONAR, Salt Lake City.

CHILD PROTECTION IN VIENNA. Rev. internat. de l'enf. **2**:682 (Aug.) 1926.

During the last six years, the scope of the public welfare department of the city of Vienna has been greatly enlarged. Agencies for the protection of children, heretofore separate and independent, have been combined under the control of Prof. Julius Tandler of the University. This central office has three divisions: relief, protection and hygiene. Efforts are made to extend needed relief within the child's home circle. The bureau has control of all illegitimate children born since 1921 and, whenever possible, may enforce the payment of maintenance fees by the father before the birth of an illegitimate child. Mothers clinics are conducted and adequate antenatal instruction afforded: medical supervision of children in the 600 schools of Vienna is assumed by this agency. Social workers trained in a special school are employed in the various activities of the office. The budget amounts to 75 million Austrian shillings, of which 35 million is spent for relief.

MATERNITY AND CHILD WELFARE WORK IN THE PUNJAB. MURIEL SIMON, Rev. internat. de l'enf. **3**:33, 1927.

One must keep in mind, in reviewing welfare work in India, that the principles of preventive medicine are entirely unknown, even among the upper classes. There are no laws regulating the practice of medicine and an exponent of the healing art is judged entirely by the speed with which he effects a "cure." Welfare work, being essentially a matter of education, proceeds slowly and is therefore accorded scant recognition. Furthermore, in the development of hygiene, century old caste rules and customs are violated. This is particularly true in the modern management of the lying-in chamber, where antagonism with the old régime must eventually result in the physical emancipation of the helpless and hapless child mothers.

The Punjab Health School was established (1921) by the Lady Chelmsford League, and the "social conscience" of the people has been awakened through tactful propaganda. Agents of the school tour the smaller towns and country districts, instructing native midwives in the essentials of cleanliness and in the detection of complications attending childbirth; home visiting is carried out on a large scale and infant welfare centers are established. English workers realize, however, that until the well-born Indian women can be made to realize their obligations, the crusade will not be productive of spectacular results.

WHAT GENEVA DOES FOR HER CHILDREN. ANDRE OLTRAMARE, Rev. internat. de l'enf. **3**:33, 1927.

The majority of the numerous institutions for child protection and welfare in Geneva were founded some time ago. Their origin was due to private enterprise, and the scope of each is somewhat restricted. These circumstances go to explain why they have experienced considerable difficulty in adapting themselves to new conditions and modern ideas. That the Genevese nevertheless take a lively interest in all matters pertaining to child welfare is proved by the large sums of money devoted yearly to the welfare and education of the young. (The yearly average per capita is: Switzerland, 48 francs; Geneva, 73 francs.)

Courses in the nursing of infants prepare the older girls for their future duties. A milk-kitchen and baby clinics assist the mothers in rearing a healthy generation. Children whose mothers are partly or wholly absorbed by their employment or other considerations are cared for in crèches and nurseries.

Attendance at school is compulsory between the ages of 6 and 15; kindergartens accept pupils from the age of 3. Backward children attend either smaller special classes or classes for the abnormal.

A well-equipped medical service, assisted by school nurses, selects children for school-dinners, holiday camps and fresh air classes.

Compulsory insurance for school children has been adopted recently, thus ensuring that all pupils receive proper attention in case of sickness.

Children whose parents are not well off are helped in their secondary studies by means of various scholarships and by a foundation called "Pour l'Avenir."

Public and private orphanages and a number of private associations deal with children deprived of one or both parents, or who are morally abandoned. Geneva has, of course, a children's court.

A great amount of valuable work is done by the Boy Scouts and Girl Guides, by the Junior Red Cross and by the "Mouvement de la jeunesse romande," an association working for the whole of French-speaking Switzerland.

A Social Secretariat has been started with the object of coordinating the entire welfare work at Geneva, including that which deals more particularly with the child population.

AMESSE, Denver.

CLINICAL RESULTS OF VACCINE AND PROTEIN THERAPY IN INFANCY. MAMERTO ACUNA and ALFREDO CASAUBÓN, Arch. latino-am. de pediat. **20**:605, 1926.

The authors conclude that all vaccine therapy, both specific and nonspecific, is harmless and not injurious if used judiciously. The specific vaccine therapy is far superior in its results to the nonspecific but even with this the authors have not had the favorable results reported by other observers. They believe that the indications and contra-indications for the use of vaccine therapy must be defined more clearly. There must be more certainty about dosage, intervals at which it is given, the type of vaccine to be used, etc. A better understanding of the defensive reactions of the body will lead to a better understanding and more precise method of use of this form of therapy.

SCHLUTZ, Minneapolis.

CAN THE BODY BECOME HYPERSENSITIVE TO ULTRAVIOLET RAYS? K. LAKSCHEWITZ, Monatschr. f. Kinderh. **34**:159, 1926.

This is an interesting and comprehensive review of a relatively new subject. Some experiments have been reported showing that the administration of fluorescent substances, such as eosin, increases the effect of the ultraviolet rays. The author reviews all the recent work and comes to the conclusion that the administration of small amounts of eosin does sensitize the body but not to the ultraviolet fraction of the spectrum; the body becomes sensitized more to the longer rays, i. e., red, green and yellow. To confirm his conclusions clinically, the author gave rachitic infants eosin and treated them with the quartz light. He found absolutely no difference between the group receiving eosin and the controls treated with light alone.

PROCEEDINGS OF THE GERMAN PEDIATRICS SOCIETY. Monatschr. f. Kinderh. **34:** 193, 1926.

The 1926 meeting of the German Society for the Study of Diseases of Children met at Dusseldorf. The first session was called to order on September 16. The proceedings, as reviewed by the *Monatschrift*, make a good sized volume, 430 pages in length.

During the first day the two main subjects of discussion were the newer observations on the tuberculin reaction and rickets.

Moro and Keller had reported experiments on nontuberculous children who gave strongly positive tuberculin reactions after a previous injection with a combination of tuberculin and cowpox vaccine. Moro now reported other experiments to show that this proceeding could be duplicated if the children were injected merely with glycerin bouillon. Following this they gave positive tuberculin reactions. This reaction occurs only with certain types of bouillon and not with that from every factory. There were other papers along the same line by Dolter, Keller and Groer. The latter suggested that the foregoing are not tuberculin reactions but are anaphylactic ones in which other proteins than the tuberculin protein are involved.

J. Becker reported experiments to show that the mechanism of defense against infection is different in the child than in the adult. In the adult the reticulo-endothelial system reacts with great proliferation. In the child there is apparently not the same type of tissue reaction, all new cells are thrown at once into the blood and little evidence of the proliferation is left.

Kurt Scheer asserted that feeding an excess of vitamin to animals led to hyperplasia of the thymus. His conclusions were severely attacked. Thomas showed that rabbits do not need orange juice to prevent scurvy. Possibly the intestinal bacteria prepare vitamin C in the intestine.

Papers on rickets were read by Kohl, Aurnhammer, Wieland, Hentschel and Zoller. All agree that the ultraviolet ray is the best curative treatment. Even premature infants can be protected from the disease if milk that has been irradiated previously is given them. This treatment, while of great value in the therapy of rickets, does not protect from the associated anemia. Kohl, however, believes that ozone is of importance in the cure of the disease. The discussion on the latter theory waxed warm. The Germans are not so diffident in discussing scientific inaccuracies as we are. Bessau opened the campaign as follows: "The speaker has given us two remedies for rickets. One, a lamp, has proved itself entirely inadequate in my clinic. The other, the ozone theory, is entirely without basis in either animal or human experiment. The German pediatric society must not be a tumbling hall for all sorts of speculations and theories. What we want is well founded clinical and experimental observation." There was much discussion, most of it unfavorable to the hypothesis, and Kohl closed the period still stoutly clinging to his colors.

There also were brief reports of studies in metabolism by Helmreich and by Reitschel, and a long clinical report on cranial asymmetry of the newborn by Weiss.

During the second day the subjects discussed pertained more to the contagious diseases. Serum does not seem to be of value in the treatment of pneumonia. Also serum, as prepared by Caronia or Degkwitz, is not a great aid in the cure of measles. Scarlet fever took a great deal of attention. Most observ-

ers are now convinced of the efficacy of the Dick procedures. There were a number of reports, the most elaborate being that of von Bokay, who discussed favorably his experience with some 7,431 Dick tests. The remainder of the session was devoted to papers on physical training and exercises for the child.

During the third day miscellaneous subjects were discussed, without conclusions of any great significance. Pyloric stenosis was not overlooked and the usual operative-nonoperative treatment was debated. In this assembly the majority were not surgeons, and so the nonoperative dietetic procedures seemed to be given the preference. Rominger and Hugo Meyer read an excellent report of metabolic study in which they concluded that the bottle-fed infant retains more mineral matter than the breast-fed baby and that mineral and water metabolism are not as intimately related as has been thought. Abels of Vienna tried to relate strophulus to infection, but the idea was not especially well received.

The fourth session opened with an excellent paper, revolutionary in its nature, by Felix Basch of Vienna. By measuring the output of urine every two hours and by simultaneous examinations of the blood, he showed that the best diuretic in kidney cases, one that is better than all drugs, is to get the patient out of bed just as soon as he is strong enough. This is more effective in starting up kidney secretion than any other method. Frick reported empyema in infants under 6 months. L. E. Molt, Jr., Striegel and Perlzweig contributed important evidence against the alkalosis theory of tetany. If they kept their alkaline solutions isotonic they could decrease the hydrogen ion concentration of the blood from 0.3 to 0.5 without producing any symptoms of tetany. They believe that injections of alkali reduce the blood calcium and attribute the tetany of so-called alkalosis to this cause. In the discussion, Freudenburg said that the alkalosis theory had never been accepted abroad. Gyorgy and later Brehme read papers on lactic acid determinations. Increased blood lactic acid seems to parallel rapid gains in weight. Adam reiterated his previous work and theories; namely, that diarrheas in children are caused by infection by a particular strain of colon bacilli.

There were a few short papers on nutrition of infants. Stoeltzner decried the use of the term dextrin-maltose as applied to many of the mixtures in use, for analyses prove that many of the so-called mixtures contain more glucose than maltose. He would rather speak of these foods under some proprietary name than to label them with a false chemical analysis. Zappert reported interesting clinical observations on the use of the roentgen ray during pregnancy. In some cases this seems to be an etiologic factor in producing microcephalus of the fetus.

The last day was devoted to a symposium on birth injuries. There were papers by Ylppö, Schwartz, von Jaschke, Zappert, Voss, Berberich, and Bungeler. These appear in the original and contain many interesting and instructive illustrations. Apparently, hemorrhages of the new-born occur much more frequently than is usually taught. These are caused by the mechanism of labor and by the fragility of the blood vessels of the new-born. Experiments by Ylppö show that the tendency to hemorrhage varies directly with the age, the vessels of the premature infant being the most fragile, and becoming a little stronger each month up to the time of birth. There is a tendency also to ascribe many of the obscure nervous disorders in infants to undiagnosed hemorrhages, and Voss has devised a series of otolgic tests, rather difficult for the average pediatrician, to aid in diagnosis. Berberich described hemorrhage into the hypophy-

sis from a birth injury, and Bungeler believes that the blood picture of the new-born with its immature cells is not the picture of the new-born at all but is the reaction of the blood-making organs to hemorrhage.

This congress must have been an interesting one. It lasted five days, and practically all the papers contained interesting and original observations and ideas.

GERSTLY, Chicago.

STAPHAR IN TREATING CHILDREN. KARL STERN, München. med. Wchnschr. **73**:1658, 1926.

Staphar is a staphylococcus vaccine obtained from staphylococci, grown under special conditions, in which the amount of specific lipoids are increased and the specific albumins decreased. This preparation was used in treating furuncles with good results.

AMBERG, Rochester, Minn.

Society Transactions

ST. LOUIS PEDIATRIC SOCIETY

Jan. 28, 1927

ADRIEN S. BLEYER, M.D., *President, in the Chair*

DIPHTHERITIC INFECTION OF THE SCROTAL CONTENTS. DR. CLARENCE MARTIN.

For twenty-six years, W. L. B., aged 77, white, American, had had a painless swelling in the left side of the scrotal sac. He was unable to account for it. Thirty-seven years prior to the onset of the condition the patient fell astride a cross bar, injuring the inguinal region and left testicle. He says he made a quick and complete recovery. Twelve years previously, the right leg was amputated at the junction of the middle and lower thirds. According to his statement, he probably had an acute infectious process followed by chronic osteomyelitis. There was no history of syphilis; the Wassermann reaction was negative.

The patient entered the hospital, Nov. 19, 1926. One week before, the scrotal condition became acute. A chill and feeling of malaise were soon followed by a rapid increase in the size of the scrotal mass and tenderness on the ventral side of the scrotum.

Fluctuation being present, a needle was inserted into the lower pole of the mass, meeting with a definitely resisting wall. One hundred and forty cubic centimeters of pus was withdrawn; the needle wound enlarged.

Dr. Charles W. Schery, pathologist at City Hospital, reported that a pure culture of the diphtheria bacillus was present. Repeated examinations disclosed the same observation. Dr. Schery inoculated a guinea-pig with the culture. It died. Autopsy revealed typical lesions of diphtheria toxemia. A pig inoculated with the same dose but protected by antitoxin survived.

Fifteen thousand units of diphtheria antitoxin was given. The condition improved. There was a grayish membrane in the sinus.

Cultures made from smears from the throat and nose were negative at all times. Material from the sinus more than a month after the first culture still showed diphtheria bacilli.

The patient refused to permit removal of the scrotal mass.

THE RELATION OF THE PHYSICIAN OF THE PRIVATE SCHOOL TO THE FAMILY PHYSICIAN. DR. ADRIEN BLEYER.

After stressing the desirability of the periodic physical examination of children attending private schools, as a duty apart from that of the family physician, it was pointed out that the old and established precedent that no physician is at liberty to examine the patient of another physician in the absence and without the knowledge of that physician is thus brought squarely forward and must not be ignored.

Rather this important phase of the problem can be provided for by the writing of a letter, a personal and not a form letter, to the family physician, advising him that the examination has taken place, that a conference has been held with the parent and that the parent has been asked to take the child to

him so that he may have opportunity of considering the matters discussed, the school thus acting as intermediary between the child and the family physician.

The success of the scheme was shown by a number of letters from the family physicians expressing appreciation and cooperation. Thus the various interests concerned, which might have become divergent in this paradoxic situation, may be harmonized, and this is, of course, altogether essential to its proper working.

HEALTH WORK AMONG COLORED CHILDREN IN THE PUBLIC SCHOOLS. DR. EDWARD J. DAVIS.

Colored children represent about 16 per cent of the school population of St. Louis. There are some striking facts as to the relative incidence of certain communicable diseases between the white and colored groups. Only 3.75 per cent of cases of diphtheria and 1.3 per cent of cases of scarlatina were found among the latter group. Forty per cent of the cases of ringworm were found among the colored. Contact inspection of children exposed to communicable diseases, who are permitted to attend school provided they submit to daily inspection, saved 1,966 days, only 6 per cent of the children contracting the disease for which they were inspected. Absentee inspection of returned pupils revealed several who were potentially cardiac. Fifty-four per cent of 10,000 pupils examined had physical defects, 32 per cent of which were corrected. There were 68 per cent of cases of dental caries, with a correction of approximately 30 per cent. Of the children weighed, 25.75 per cent of the white and 19.5 per cent of the colored were 7 per cent or more underweight, showing an unexplained tendency of colored children of the same age group to weigh more than the white. Ten per cent were inspected for noncommunicable diseases. Eighteen boys and 446 girls had enlarged thyroids. Toxin-antitoxin was administered to 163. One third of the tuberculosis contacts of elementary school age were colored. Twenty-four per cent of these entered the Open Air School. Forty-one pupils with a variety of deformities were enrolled in the school for cripples and seven were admitted to the sight conservation class. All have been subjected to intensive study and indicated remediable measures have been applied.

HEALTH WORK AMONG WHITE CHILDREN IN THE PUBLIC SCHOOLS OF ST. LOUIS. DR. E. H. ROHLFING.

This report dealt largely with methods employed by the St. Louis Board of Education in its health program. It was stated that no essential difference exists in dealing with the colored children.

A short history of the work was traced from its beginning in 1909 and the present organization of the Hygiene and Allied Divisions of Health and Physical Education, under the Department of Instruction, was indicated.

The function of the special schools and classes operated for care of the physically handicapped was briefly discussed under the following heads: semi-sighted and speech classes; schools for deaf, crippled and mentally deficient; open air schools; free dental clinics; schools operating shower baths.

Fourteen duties of inspectors (physicians giving "undivided attention") were named and briefly discussed. Five special duties of nurses were named and discussed.

Some selected statistics from the annual report of 1925-1926 were given to show the results obtained.

Book Reviews

La Rougeole. Épidémiologie, Immunologie Prophylaxie. By Robert Debré and Pierre Joannon. Price, $1.00. Pp. 288. Paris: Masson et Cie, 1926.

This timely book, published under the egis of the Institute of Hygiene of the Faculty of Medicine of Paris, carries the solemn warning that measles constitutes one of the most important and most pressing problems of preventive medicine among diseases of children at this time.

A comparison of the mortality curves of some of the common infectious diseases in European countries shows some striking facts. For example, smallpox was found to have been declining since the early sixties of the last century, and the decrease in the incidence of diphtheria was found to have set in twenty years or more before the contributions of Roux and Behring; since then, of course, it has been striking. Whooping cough has shown a tendency to decline in the last half century, and scarlet fever, as is commonly known, has steadily declined until recent years. Measles, on the other hand, has shown a remarkable increase and has, in fact, if Europe is taken as a whole, risen from fourth to first place. In Europe, in the period from 1900 to 1910, the deaths from measles have surpassed those from scarlet fever, whooping cough, diphtheria or smallpox, and not less than 700,000 are credited to it in that period. Furthermore, it is shown that if deaths from measles, which occur before the eruption, and those due to pneumonia and otitis, which owe their prepared soil to measles, are added, a million deaths in the ten years would probably not be too high. This is food for thought, to say the least.

It was also interesting to note that in Japan and in the United States and in certain countries of South America the death rates for measles have not been so high as in Europe. In the United States the number of deaths from measles (registration area only) in the period from 1901 to 1920 fell below that of diphtheria and whooping cough but was higher of course than that of scarlet fever. They were as follows:

Measles	Scarlet Fever	Whooping Cough	Diphtheria
105,115	79,097	120,486	217,747

These figures may be compared with those in France for the shorter period from 1906 to 1913, which were as follows:

Measles	Scarlet Fever	Whooping Cough	Diphtheria
31,125	9,864	25,127	24,948

Thus the United States is losing about 5,000 children a year from measles, while France, with about one-third our population, is losing about 4,000 or almost three times as many. It is thus not to be wondered at that the physicians of that country are alarmed as to the situation regarding measles. In no other country of the world is measles at this time so deadly as in France, and it is to be noted that in England and also in Belgium measles has likewise come to take first place as the most deadly of the infectious diseases of children.

Another thing that is studied with great thoroughness in this book is the relation of age, the influence of crowding and insanitary surroundings, hospital

grouping and particularly of nurseries, on the death rate of measles, it being found that in no disease (with the exception of the relation of age to whooping cough) is the influence of such factors so potent as in measles. It is found that the age of onset of measles is lower among the poor than among the well to do and that the mortality is correspondingly higher, while in nurseries, mortalities as high as 62 per cent are reported. It thus seems to be the nursery and the insanitary surroundings of the poor and the related malnutrition induced by such factors in the great cities of Europe that contribute most heavily to the distressing mortality of measles in that part of the world.

In defense of hospital care as a contributing factor the authors draw attention to a report made by them to the Pediatric Society in 1924, which showed that a majority of deaths from measles occurred during the first three days in the hospital, thus throwing the burden back on the surroundings of the child before his admission and the unsatisfactory physical status linked up with such surroundings.

In discussing the question of receptivity and the immunology of measles and the prevention of this disease, the authors are hopeful as to the future of active immunization and are ardent in their plea for the use of convalescent serum as a preventive at this time. They favor the collecting of serum whenever possible for distribution when needed and of course to those places, the nurseries and the homes of the poor, in which the ravages of the disease are most in evidence.

Much praise is due to the authors for the painstaking preparation of their tables and for the forceful and enlightening use to which they have put them.

GUIDE PRACTIQUE DE LA MERE. By RUDAUX and C. MONTET. Price, 40 cents. Pp. 168. Paris: Masson & Cie, 1926.

This book deals with the care of the child during the first two years of life. The instructions as to equipment, clothing, bathing and feeding are accompanied by detailed illustrations. The normal development is discussed so that the mother may recognize any deviation from it. The last part of the book gives in detail procedures necessary in the care of the sick child, thus relieving the physician of some of the minute description that often seems necessary.

Directory of Pediatric Societies

NATIONAL

AMERICAN MEDICAL ASSOCIATION, SECTION OF DISEASES OF CHILDREN

Chairman: Dr. Henry Gerstenberger, 2103 Adelbert Road, Cleveland.
Secretary: Dr. Hugh McCulloch, 500 Kingshighway, St. Louis.
Place: Washington, D. C. Time: May 18, 19 and 20.

AMERICAN PEDIATRIC SOCIETY

President: Dr. Isaac A. Abt, 104 S. Michigan Ave., Chicago.
Secretary: Dr. Howard Childs Carpenter, 1805 Spruce St., Philadelphia.
Place: Cruise on Chesapeake Bay. Time: May 12 to 16.

THE ASSOCIATION OF AMERICAN TEACHERS OF THE DISEASES OF CHILDREN

President: Dr. Frank P. Gengenbach, 452 Metropolitan Bldg., Denver.
Secretary: Dr. Paul W. Emmerson, 86 Bay State Road, Boston.
Place: Willard Hotel, Washington, D. C. Time: May 17, 1927.

AMERICAN CHILD HEALTH ASSOCIATION

President: Mr. Herbert Hoover, Department of Commerce, Washington, D. C.
Secretary: Dr. Philip Van Ingen, 125 E. 71st St., New York City.
Place: Washington, D. C. Time: May 9 to 11.

CANADIAN SOCIETY FOR THE STUDY OF DISEASES OF CHILDREN

President: Dr. Howard Spohn, 718 Granville St., Vancouver, B. C.
Secretary: Dr. Frederick F. Tisdall, 102 College St., Toronto, Ont.
Place: Toronto or vicinity. Time: June 13 and 14.

SECTIONAL

CENTRAL STATES PEDIATRIC SOCIETY

President: Dr. O. L. Goehle, 15703 Detroit Ave., Lakewood, Ohio.
Secretary: Dr. H. T. Price, 121 University Place, Pittsburgh.
Place: Cleveland. Time: Oct. 14 and 15, 1927.

SECTION ON PEDIATRICS OF SOUTHERN MEDICAL ASSOCIATION

President: Dr. Robert A. Strong, Pass Christian, Miss.
Secretary: Dr. Hugh L. Dwyer, Medical Arts Bldg., Kansas City, Mo.
Place: Memphis, Tenn. Time: Nov. 14 to 17, 1927.

LOCAL

CHICAGO PEDIATRIC SOCIETY

President: Dr. George Baxter, 4603 Broadway, Chicago.
Secretary: Dr. J. K. Calvin, 104 S. Michigan Ave., Chicago.
Place: City Club. Time: Third Tuesday of each month.

THE PEDIATRIC SECTION OF THE ACADEMY OF MEDICINE OF CLEVELAND

Chairman: Dr. Henry J. Gerstenberger, 2103 Adelbert Road, Cleveland.
Secretary: Dr. Charles W. Burhans, Lakeside Hospital, Cleveland.
Place: 2009 Adelbert Road. Time: Feb. 10, May 7, Sept. 22 and Dec. 15.

DETROIT PEDIATRIC SOCIETY

President: Dr. Thomas B. Cooley, 987 Jefferson Avenue, East, Detroit.
Secretary: Dr. W. S. O'Donnell, 1563 David Whitney Bldg., Detroit.
Place: Children's Hospital of Michigan. Time: No fixed date; approximately once a month.

PEDIATRIC SECTION OF FULTON COUNTY MEDICAL SOCIETY, ATLANTA, GA.

President: Dr. William W. Anderson, 362 Peachtree St., Atlanta.
Secretary: Dr. Lee Bivings, Exchange Pl., Atlanta.
Place: Academy of Medicine, 32 Howard St., Atlanta.
Time: Second Thursday of each month from September to April, at 8 p. m.

LOUISIANA STATE PEDIATRIC SOCIETY

President: Dr. L. R. De Buys, 1487 Delachaise St., New Orleans.
Secretary: Dr. F. J. Kinberger, 3601 Prytania St., New Orleans.
Place: New Orleans. Time: April 25, 1927.

MEMPHIS PEDIATRIC SOCIETY

President: Dr. Walter L. Rucks, 1074 Madison Ave., Memphis, Tenn.
Secretary: Dr. J. B. Blue, Columbian Mutual Tower, Memphis, Tenn.
Place: Baptist Memorial Hospital. Time: Second Tuesday of each month.

MILWAUKEE PEDIATRIC SOCIETY

President: Dr. Roy M. Greenthal, 141 East Wisconsin Ave., Milwaukee.
Secretary: Dr. M. G. Peterman, 167 Seventeenth St., Milwaukee.
Place: Children's Hospital, Milwaukee. Time: Second Wednesday of each alternate month.

NEW ENGLAND PEDIATRIC SOCIETY

President: Dr. James Herbert Young, 66 Commonwealth Ave., Boston.
Secretary: Dr. Thomas Lanman, 286 Marlborough St., Boston.
Place: Boston Medical Library. Time: Second Friday of each month.

PEDIATRIC SECTION OF THE NEW YORK ACADEMY OF MEDICINE

Chairman: Dr. Lewis C. Schroeder, 39 E. 61st St., New York City.
Secretary: Dr. William R. May, 8 East 66th St., New York City.
Place: New York Academy of Medicine. Time: Second Thursday of each month.

NORTHERN CALIFORNIA PEDIATRIC SOCIETY

President: Dr. C. F. Gelston, 384 Post St., San Francisco.
Secretary: Dr. Mary H. Layman, 2116 Pacific Ave., San Francisco.
Place: Alternates between Stanford University Hospital, University of California Hospital, and Children's Hospital. Time: Three or four times a season.

NORTHWESTERN PEDIATRIC SOCIETY

President: Dr. C. A. Stewart, 730 La Salle Bldg., Minneapolis.
Secretary: Dr. E. S. Platou, 730 La Salle Bldg., Minneapolis.
Place: Three at the Medical Campus, Minneapolis and one at the Town and County Club. Time: Winter, Spring, Summer, Fall.

PHILADELPHIA PEDIATRIC SOCIETY

President: Dr. Frederick Fraley (Retiring), Overbrook, Pa.
Secretary: Dr. John P. Scott, 2040 Pine St., Philadelphia.
Place: College of Physicians, 19 S. 22nd St., Philadelphia. Time: Second Tuesday of each month.

THE ROCKY MOUNTAIN PEDIATRIC SOCIETY

President: Dr. W. Wiley Jones, Majestic Bldg., Denver.
Secretary: Dr. Berryman Green, Republic Bldg., Denver.
Time: Third Saturday of each month, 2 to 4 p. m. Place: Children's Hospital, Denver.

ST. LOUIS PEDIATRIC SOCIETY

President: Dr. T. Wistor White, Lister Bldg., St. Louis.
Secretary: Dr. Edwin Rohlfing, Grand Blvd. and Wyoming St., St. Louis.
Place: St. Louis Children's Hospital. Time: Third Friday in each month.

SOUTHWESTERN PEDIATRIC SOCIETY

President: Dr. Joseph Shuman, 1136 West 6th St., Los Angeles.
Secretary: Dr. Wm. Sidney Bowers, 1136 W. 6th St., Los Angeles.
Place: University Club of Los Angeles. Time: First Wednesday in January, March, May, September and November.